

THE MONIST

THE BIFURCATION OF NATURE

I

IN the second chapter of his *Concept of Nature* Professor A. N. Whitehead lays down as the first principle to be guarded in framing this concept that we must avoid vicious bifurcation. Nature is nothing else than the deliverance of sense-awareness. Our sole task is to exhibit in one system the characters and inter-relations of all that is observed.

There reigns in philosophy and in science, he says, an apathetic acquiescence in the conclusion that no coherent account can be given of nature as it is disclosed to us under sense-awareness, without dragging in its relations to mind. But that is for him no part of the business of those whose concern is to develop a concept of nature. So Mr. Whitehead bids us leave to metaphysics the synthesis of the knower and the known. We are to ask nothing about the percipient and restrict our inquiries to that which is perceived. Everything perceived is in nature. We may not pick and choose. All our sense perceptions are in the same boat and must be treated alike. The red glow of the sunset is as much part of nature as are the molecules and electric waves by which men of science would explain the phenomenon. It is for natural philosophy to analyse how these various elements of nature are connected.

This means a refusal to countenance any theory of

"psychic additions" to that which is known in perception. Under traditional treatment, the so-called secondary qualities such as colour, scent, savour, and sound, are regarded as dependent on the percipient mind, leaving to nature only the primary qualities which influence the mind to perceive a lot of things that are not there. Mr. Whitehead's contention is that to drag in the mind as making psychic additions is merely a way of shirking the problem of natural philosophy. That problem is to discuss the relations *inter se* of things known, abstracted from the "bare fact" that they are known.

What Mr. Whitehead protests against is a bifurcation of nature into two systems of reality, which, in so far as they are real, are real in different senses; or into two divisions, namely, the nature apprehended in awareness and the nature which is, in some sense, the cause of awareness. I say "in some sense" because he distinguishes the causation involved in interactions within nature from the causation attributed to the influence of nature on "the alien mind" which, it is said, thereupon perceives things that are thus endowed with qualities that, apart from this endowment with psychic additions, are not there. Mr. Whitehead insists that, for those who have not, under the influence of theory, abandoned an "immediate instinctive attitude," there they are. The nature which is apprehended in awareness holds within it the greenness of the trees, the song of the birds, the warmth of the sun, the hardness of the chairs, and the feel of the velvet.

Such in brief reminder is the argument of the second chapter of the *Concept of Nature*. But in the opening chapter we are told that nature as disclosed in sense-perception is self-contained as against sense-awareness, in addition to being self-contained as against thought. Mr. White-

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head expresses this self-containedness of nature by saying that nature is "closed to mind." He adds, however, that this closure of nature does not carry with it any metaphysical doctrine of the disjunction of nature and mind. What then does it mean? It means that in sense-perception nature is disclosed as a complex of entities whose mutual relations are expressible in thought without reference to mind. As Mr. Whitehead puts it: When we are thinking *homogeneously* about nature we are thinking about it without thinking about thought or about sense-awareness; but when we are thinking *heterogeneously* about nature we are thinking about it in conjunction with thinking about such extraneous matters. His plea is for homogeneous thinking.

To this end he bids us concentrate attention on that which is known to us as the "direct deliverance" of sense-awareness. This implies no doubt a relation of mind—broadly speaking the cognitive relation—to "the terminus thus disclosed;" and he does not deny that there are relations to minds of natural entities other than those which are the termini of sense-awareness. Furthermore we are told that since thought is wider than nature there are entities for thought which are not natural entities. In any case it is clear that sense-awareness affords an instance of relatedness. But Mr. Whitehead feels justified in asserting that this cognitive relation makes no difference to nature as disclosed in sense-perception.

For one whose method of treatment is so strictly relational as is Mr. Whitehead's, nature and mind are in some mode of relation. Hence he repudiates any "disjunction." But he no less repudiates any "conjunction" so long as we are thinking homogeneously about nature. What does this mean? I hazard the opinion that under "conjunction" he has in view so-called internal relations,

whereas under "disjunction" the relations are external.

Under internal relatedness a given entity *a* is what it is in its relation to the whole alphabet of other entities; under external relatedness *a* is what it is solely in itself, that is, irrespective of the rest of the alphabet. There is, however, no reason why all the letters of the alphabet should be internally related. There may be ground for excluding, say, *p*, *q*, *r*, as externally related; and these may be psychic or mental. In that case *a* has "additions" in respect of all relations save *p*, *q*, *r*, but none in respect of these relations, that is, no "psychic additions." This I take it to be Mr. Whitehead's position.

II

Let us, however, look a little more closely into Mr. Whitehead's philosophy of nature. We must start with the event as the ultimate unit of natural occurrence on some "epochal occasion." Any event has to do with all that there is, and in particular with all other events. Thus, the actual world is a community of epochal occasions. In the physical world, under this concept of nature, each epochal occasion is a definite and limited physical event, limited as to space and time, but with time-duration as well as with its full spatial dimensions. These epochal occasions are the primary units of the actual community, and the community is composed of its units. But each unit has a "prehensive" relation to every other member of the community, so that each unit is a microcosm representing in itself the entire all-inclusive universe of events.

We have thus within nature a prehensive interfusion of events which may be spoken of in terms of "aspects." There is a reciprocity of aspects, and there is a pattern of aspects. Each event corresponds to two such patterns;

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namely the pattern of aspects of other events which it grasps into its own unity, and the pattern of its aspects which other events grasp into their unities. There is thus an intrinsic and an extrinsic reality of an event, namely, the event as in its own prehension and the event as in the prehension of other events. The word which Mr. Whitehead uses for the intrinsic reality of an event is "value."

All this is subject to the doctrine that the relationships of an event are internal. They are intrinsically constitutive of what the event is in itself; but always in conjunction with all other events, since each event is a microcosm representing in itself the entire all-inclusive universe with its plurality of organisms.

The concept of organism is now so familiar as to call for little recapitulation here. The individualised organism is a community of subordinate organisms each of which plays the part of member within the community, but in relation to every other member. The word "member" here emphasises the organic conjunction, subject always to internal relations, but subject also to the concept of substance in the sense implied by the word "community" as naming a synthesis of parts within a whole. The parts, as members, Mr. Whitehead says, are evidently constitutive of the community as a whole. But the whole is evidently constitutive of the part. Here "whole" and "part" are used in the sense which Mr. Whitehead thus characterises: The part is an event which is "extended over" by the other event which is the whole.

III

In his brilliant historical sketch of the progress of thought, technological, scientific, and romantic, Mr. Whitehead says that the nineteenth century, in its last twenty years, closed with one of the dullest periods since the time

of the First Crusade. Here almost suddenly a pause occurred. But dull as it was, in Mr. Whitehead's opinion, the close of the century was the seed-time of later harvest—the harvest of evolution. During the twenty years pause the main work, he tells us, was the absorption of the doctrine of evolution “as guiding the methodology of all branches of science.” And he regards a thorough-going evolutionary philosophy as inconsistent with materialism. It heralded the advent of organism.

The aboriginal stuff from which a materialistic philosophy starts is, he says, incapable of evolution. So-called evolution, on this theory, is reduced to the rôle of being another word for the description of the changes of the external relations between portions of matter. There is nothing to evolve because “one set of external relations is as good as any other set.” But the whole point of the modern doctrine is the evolution of complex organisms from antecedent states of less complex organisms. The doctrine of evolution thus “cries aloud for a conception of organism” as fundamental in nature. And in Mr. Whitehead's philosophy of nature the concept of organism stands rooted in the unreserved acceptance of internal relations. Amid sundry hard sayings that, I think, is at the root of the matter.

So long as we think homogeneously the whole course of evolution falls within the closed system of nature as disclosed to mind in accordance with the deliverance of sense-awareness. At any rate it is here that we are to seek the foundations of the superstructure of nature. But in discussing this sense-awareness we are not to ask anything about the percipient. We are to deal only with that which is perceived. That, one might suppose, excludes the word “percipient” as applicable in discourse concerning a closed system of nature. But this closed system does, we

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are told, include the "percipient event" as a natural occurrence. This percipient event is the relevant bodily state of the organism. Thus, as a physical event, it is part of nature and, in conjunction with other physical events, it falls within the scope of evolution. Percipient events are therefore to be discussed in terms of internal relations, otherwise they would not be implicated in the evolutionary process which characterises the advance of organisms within the closed system of nature. In this advance there is passage towards new organisms which are spoken of as emergent. Mr. Whitehead also speaks of the "creativity" whereby the actual world has its character of temporal passage towards novelty.

IV

I have tried so far to keep within the concept of nature, and to summarise Mr. Whitehead's own statements. It is a little difficult to do so since he so often goes beyond events and introduces his concept of "objects." He says, for example, that the interfusion of events "is effected by" the aspects of those eternal objects, such as colours, sounds, scents, geometrical characters, which are required for nature "but are not emergent from it." Here we come into touch with entities for thought which are not natural entities, and which are not, as such, subject to evolution, though through them certain natural entities are "realised" (or, as Mr. Whitehead sometimes says, "actualised") for sense-awareness. Such objects are ingredients of events, or are "ingressive into the situations of events." The situation is part of nature in the sense that the whole of nature extends over it. But the object is not part of nature, for nature is the total assemblage of events in passage towards novelty, and objects are elements which do not pass. Mr. Whitehead speaks of them as "elements in

nature," but, I take it, they are not yet in nature until they enter into situations through ingression. Having so entered, however, "the organism is a unit of emergent value, disclosing a real fusion of the characters of eternal objects, emerging for its own sake," but in internal relations to other organisms and to the all-inclusive universe of events.

Objects are of radically different types. For each type "situation" and "ingression" have their special meanings. Happily we need not think of them all, since the idea of situation has peculiar importance in regard to three types of objects; (1) sense-objects; (2) perceptual objects (subdivided into (*a*) physical objects and (*b*) delusive objects); (3) scientific objects. Atoms and molecules, for example, are distinctively scientific objects; a brick is a perceptual object; its colour or its "feel," a sense-object. Each in its special way is ingressive into that situation or cluster of events which we commonly speak of as the brick. These three types form an ascending hierarchy of which each member presupposes the type below. Objects of this, that or the other type are recognisable, but their "recognition" in no way alters the character of that which is recognised. It is noteworthy that this doctrine of objects is not restricted to so-called secondary qualities. It is not set forth as an alternative to the vicious bifurcation of nature, nor does it imply any psychic additions to nature. On this Mr. Whitehead is emphatic.

V

The argument in the *Concept of Nature* is that nature is what it is irrespective of any awareness thereof, or, as I prefer to say, any mental reference thereto. If we hold fast to this cardinal belief, we may leave to metaphysics the synthesis of the knower and the known. That implies that this synthetic relatedness opens up a problem for

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metaphysics. And by metaphysics Mr. Whitehead tells us that he means the science that seeks to discover the general ideas which are indispensably relevant to the analysis of everything that happens. Something that happens is my awareness of, or perceptive reference to, yonder wall. We have, then, to consider the general ideas that are indispensably relevant to the analysis of this occasion. One of these, for Mr. Whitehead, is the ingression of objects into the situation. In this he firmly believes on metaphysical grounds. In any bifurcation of nature which entails psychic additions he disbelieves on logical grounds. He admits that it has been seriously entertained by respectable thinkers. He admits its "astounding efficiency" as a system of concepts for the organisation of scientific research. But this affords no justification for its acceptance. The pragmatist, he says, will swallow anything so long as it works. When all is said and done it is still "quite unbelievable." What *au fond* is for him unbelievable? I submit that it reduces to this: It is for him unbelievable that cognitive relations are other than irretrievably external.

Such cognitive relations there are. Among them is sense-awareness. The hyphen betokens this relation; so we have S-*a*. The crucial question then is: Does this hyphen betoken an external or an internal relation? In other words, is S.—the sensum—what it is in its cognitive relation to *a*; or is it what it is whether it be in cognitive relation to *a* or not? Mr. Whitehead, as I understand, believes that this relation is external; for, if it were internal, S. would be infected by psychic additions. He comes near to saying that this is so. The body, he tells us, pollutes the mind, the mind pollutes the body. Physical energy sublimates itself into zeal; conversely zeal stimulates the body. But there the context is action suffused

with feeling, and here and now the context is, broadly speaking, knowledge.

So long as Mr. Whitehead deals with nature as closed to mind he takes mind as spectator of that which is enacted on a space-time stage under the push and pull of "causal efficacy," or the relational go of events. But the theatre and the bodies of the spectators are on the physical stage. Only the minds of the spectators are off the stage. They dwell in a different world. Hence Mr. Whitehead, who weighs his words, speaks of the "alien" mind.

I suppose that one should try to think "homogeneously" in dealing with this alien mind—regarded as alien because its relation to all that is transacted on the physical stage is external only. But it is hard to do so. It is more difficult to discuss a concept of mind alienated from a concept of nature than to discuss a concept of nature alienated from a concept of mind. This difficulty Mr. Whitehead has to face. In his Barbour-Page lectures on *Symbolism* he presents his concept of mind as a companion picture to his concept of nature, developed in the earlier Turner lectures. If in both there is some heterogeneous thinking, this is perhaps inevitable in any attempt to discover the general ideas which are indispensably relevant to the analysis of everything that happens.

In *Symbolism* Mr. Whitehead is no longer chiefly concerned with the concept of nature as a closed system but with certain modes of activity of the human mind where activity is another name for self-production. The human mind, he says, is functioning symbolically when some components of its experience elicit "consciousness, beliefs, emotions, and usages," respecting other components of its experience. The former set of components are the symbols; the latter set constitute the meaning of the symbols. Symbolism from sense-presentation to physical bodies is the

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most natural and widespread of all symbolic modes. This symbolism from our senses to the bodies symbolised is no doubt often mistaken. But that is true of all symbolism. Direct experience only is infallible. "I shall develop the thesis," Mr. Whitehead says, "that symbolism is an essential factor in the way we function as the result of our direct knowledge," and he proceeds on the assumption that sense-perception is mainly a characteristic of more advanced organisms, whereas all organisms have experience of causal efficacy whereby their functioning is conditioned by their environment.

One may here ask whether all organisms that have experience (which, he says, may be physical or mental) of causal efficacy includes atoms and molecules as organisms. I think that it does. For Mr. Whitehead is not one of those who use salient words on which an argument hinges now in one sense and now in another. Furthermore, later on, he speaks of "pure instinct" as the response of an organism to pure causal efficacy; and he adds: All physical response on the part of inorganic matter to its environment is thus properly to be termed instinct. This is noteworthy since it throws light on what he means by that causal efficacy, which he speaks of as "the hand of the settled past in the formation of the present."

In any case stress is laid on the experience of causal efficacy as primitive. The world given in sense-presentation is not the aboriginal experience of the lower organisms, later to be sophisticated by inference to causal efficacy. The contrary is the case. They may be inseparable, but first the causal side of experience is dominating, then the sense-presentation gains in subtlety.

Both fall under the general heading of Direct Recognition. This is the first type of cognitive functioning. It is, we are told, primarily the recognition of "objects" in-

gressive into the situation; but, as I understand, it is derivatively the recognition of their presence as ingredients in the situation. The second type of cognitive functioning is Symbolic Reference. Here we pass to the meaning that is symbolised. The nature of the relationship does not itself determine which is symbol and which is meaning. There are no components which are only symbols or only meanings. The more usual symbolic reference is from the less primitive component as symbol to the more primitive as meaning, for example from presentational immediacy to causal efficacy.

Leaving for awhile causal efficacy on one side, we find a group of words centering round presentational immediacy or immediate presentation. We have immediate experience which in one sense, he tells us, means "an ultimate physical fact." Then, in mental regard, we have sense-experience, direct experience, immediate acquaintance, direct recognition, direct perception, and direct knowledge. In view of what was said on the hierarchical order of "objects" one may, I think, select (1) immediate presentation in sense-experience; (2) direct perception; (3) direct knowledge (where "our mentality intervenes with its conceptual analysis"); as standing in hierarchical order, so that (3) presupposes (2) and (2) presupposes (1). If so, this accords with the stages of mental development which I have been led to distinguish as percipient, perceptive, and reflective. The point for emphasis is this: that, if we keep to the cognitive relation, the words "immediate" and "direct" imply that there are no psychic additions, for that would import vicious bifurcation into nature. In so far as immediate, that which, in current phrase, is "directly apprehended," is nowise altered under such apprehension. In other words the cognitive relation as such, is external. And this I make bold to say though Mr. Whitehead asserts

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that, for the percipient at least, the perception is an internal relationship between itself and the things perceived. Does he not here mean the percipient event? In *Symbolism* "percipient" nearly always means mentally percipient and not only physically prehensive. And whereas in *Science and the Modern World*, Mr. Whitehead adopts a position of "provisional realism," in *Symbolism* he finds the foundation of a "thorough-going realism."

VI

Allow me here for a brief space to depart from Mr. Whitehead's text. In my own analysis of mental reference I distinguish three main levels—percipient, perceptive, and reflective. At the reflective level we accept a geometrical space-time scheme with effective relations—a construct of scientific thought for the interpretation of physical occurrences. At the perceptive level no such scheme is in being for the someone, say a two-year-old child, who perceives. None the less there is prospective reference and location in place—both suitably defined, but not as Mr. Whitehead physical defines "simple location." At the percipient level, under distinguishing analysis, there is neither prospective reference nor location in place. Space and time are not in the mental picture which is wholly lacking in perspective. There are all the so-called secondary qualities for which special modes of percipient reference have been evolved. There are as yet no primary qualities since, as spatio-temporal, they are emergent only at the higher level of perception. I have elsewhere (in *Mind at the Crossways*) stated the analytic grounds on which I base these conclusions.

My reason for introducing, parenthetically, the foregoing paragraph is that it bears on causal efficacy. I am myself increasingly shy of using either word since both are

ambiguous. If I substitute for it effective relatedness there will be those who say that this is a quibbling verbal distinction. Let me then state briefly what I mean. At the reflective level of scientific thought we seek to interpret events—let us say physical events. We are now-a-days bidden to do so in terms of a conceptual space-time scheme. But when we regard the event as an effect we need something more in the relational field than space-time only. Mr. Whitehead says that we need an element of "impetus." I am content to speak of effectiveness.

But can we discuss causal efficacy or effective relatedness save at the reflective level? That is the point I raise. I hazard the opinion that at the age of two years Mr. Whitehead did not perceive causal efficacy though he did perceive much that he would now interpret in terms of this concept. And what he thus interprets is, I submit, not primarily the cognitive relation in presentational immediacy, or in direct perception, or even in direct knowledge, but what one may speak of as immediacy of awareness in behaving under percipience. That is no less primitive than is the percipience to which it is adjunct in all organisms which respond to stimulation.

On this understanding there is much in what Mr. Whitehead says on causal efficacy with which I am in cordial agreement. We both, I think, seek touch with something in common to nature and mind. And when he contends that it is a complete inversion of the evidence to say that presentational immediacy as perceptive is primitive and causal efficacy derivative, I hear an echo of Mr. S. Alexander's contention (and mine) that *genetically* action is precedent to knowledge. But (I submit) our primitive mental touch with causal efficacy in action is not cognitive but in the wider sense conative. It does not lead

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I want just now to keep close to the cognitive factor in the mind's conduct of affairs. Hence I resist the temptation to discuss Mr. Whitehead's doctrine—set forth in *Religion in the Making*—of "the aesthetic consistency of the world" however this may be brought about through ingression or otherwise. Here "aesthetic" connotes "feeling," and "feeling" is a synonym for "activity," while "activity" is "another name for self-production." Whence it follows that "an actual fact is a fact of aesthetic experience" (which need not be mental). As a plank in the platform of Mr. Whitehead's philosophy this is important. But it does not closely bear on the bifurcation of nature.

VII

More close in its bearing is the plural (worlds) in such a passage as "the various relationships within the real physical and spiritual worlds." We here come into touch with the relation between the percipient event in the context of one world and the mental percipient in the context of another world. We are told that "our most immediate environment is constituted by the various organs of our own bodies." It seems, then, that the percipient event is "environmental" to mental percipience. Such, in other words, is the relation of the physical occasion to the mental occasion.

There are two routes of "creative passage" from a physical occasion. One is towards "another physical occasion," and the other is towards "the derivative reflective occasion." The physical route links together physical occasions as successive temporal incidents in the life of the body. The other route "links this bodily life with a correlative mental life." A mental occasion is an ultimate

fact in the spiritual world, just as a physical occasion is an ultimate fact in the physical world. There is an essential reference from one world to the other. Here again two worlds; and, if I rightly understand, the linkage of physical occasions as temporal incidents in the life of the body, is radically different in character from that of a mental route with a correlative physical route. It exhibits, he says, "a new dimension of transition." Indeed this latter "linkage" may be negligible or absent. In the case of men and animals, there are obviously both routes in some way closely connected. In the case of a bit of inorganic matter any associate route of mentality seems to be negligible. On Mr. Whitehead's metaphysical theory, a belief in "purely spiritual beings" means that there are routes of mentality in respect to which associate material routes are negligible, or entirely absent.

We do find, however, that in men and animals the two routes in two worlds are closely associated and that there is something common to both. And that which the occasions have in common is, as I gather, derived by inheritance from the antecedent members of both routes. Here the word "inheritance" expresses what is elsewhere spoken of as "the conformation of state to state," the later to the earlier, from which, he says, temporal succession is a derivative abstraction, namely, the irreversible relationship of settled past to succeeding present. I take it that memory is an instance of such "inheritance" in so far as there is retention of the antecedent life-history of some dominant pattern; and that, in this sense, memory is common to mental and physical routes.

These mental and physical routes are in some way connected *within us*. It is *here* that their relation is discussed by Mr. Whitehead. And yet, till he comes to details, he protests against "the transformation of the grand question

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of the relations between nature and mind into the petty form of the interaction between the human body and mind." I confess that, as one who seeks to be a faithful expositor, I am somewhat embroiled in difficulties. There are two worlds in some sense alienated—the physical and the spiritual worlds. But it seems from certain passages that it is hard to tell which is which. There is, in fact, we read, no proper line to be drawn between the physical and the mental constitution of experience. "It is a matter of pure convention as to which of our experiential activities we term mental and which physical." None the less, though they are only distinguishable under pure convention, there are two worlds, and in the one there are no psychic additions from the other.

VIII

Passing to another matter, I take it that the physical occasions which are in nature just pursue their creative routes, or, as Mr. Whitehead puts it, "blindly run." And I take it that the word "blindly" implies absence of cognitive foresight. But in human affairs there seems to be a good deal of running that is not blind but open-eyed. Here certain trains of events run subject to cognitive reference to an end in view. And in some way this cognitive reference does seem to make a profound difference in the way in which these physical events run their course in nature. But the closed system of nature brooks no psychic additions. As such it runs blindly. And yet the world of human affairs does not run blindly. In that world we have to reckon with mental guidance. Mr. Whitehead emphasises volitions without adding, as is elsewhere his wont: By volition I mean. . . . ; and without disengaging that cognitive factor in volition which an end in view unquestionably implies.

He says that we are faced by a dilemma. Either the physical molecules in the body run blindly or they do not. If they do, mental states are irrelevant; if they do not, mental states are relevant. He urges that the mental states *are* relevant, and that events in the body do *not* run blindly. We must not think in terms of materialism which applies only to very abstract entities the products of logical discernment; we must think in terms of organism. The "concrete enduring entities," he says, are organisms, so that the plan of the *whole* influences the very characters of the subordinate organisms which enter into it. In the case of an animal the mental states enter into the plan of the total organism and thus modify the plans of the successive organisms until the ultimate smallest organisms are reached. Thus an electron within a living body is different from an electron outside it by reason of the plan of the body. The electron runs blindly within or without the body; but it runs within the body in accordance with the plan of the body, and this plan includes the mental state. But, he adds, this principle of modification is perfectly general throughout nature and represents no property peculiar to living bodies.

I hold this to be sound doctrine. The principle of modification is that which is entailed by the unreserved acceptance of internal relations. It is the principle of modification through membership in a community. But the word "organism" is no longer used only within the closed system of "nature" as hitherto defined by Mr. Whitehead—that closed system the interpretation of which is the specialised task of the physicist. The organism now includes not only the modes of relationship emphasised in physical inquiry; it includes also mental relations which make a difference and are effective or betoken causal efficacy. But essential to the interpretation of a natural

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organism—that is an organism which is part of nature as a whole—is internal relatedness; and it now seems that essential to the interpretation of a “concrete” organism is internal relatedness.

IX

So long as we keep strictly to a concept of nature, as Mr. Whitehead characterises nature, we are not called on, he says, to make any pronouncement as to the psychological relation of subjects to objects, in the traditional sense of these words. None the less he does announce that nature is closed to mind. The presence or absence of mental relations makes no difference to nature.

And so long as we keep strictly to this concept of nature the word “organism” carries a definite meaning. The organism is within nature. And if nature as a whole is closed to mind so also is an organism, as a part of nature, closed to mind.

But then we are told in due course that the “concrete organism” is not closed to mind. It includes the mental state. One would infer that “concrete nature”—if I may use this expression—of which the concrete organism is a part, is not closed to mind; and that a concept of nature which is closed to mind, is in that measure abstract.

Furthermore, it is in the context in which volition is under discussion that we are introduced to the concrete organism which is no longer closed to mind. And, since volition implies distinctively cognitive relations which make a difference in the running of physical trains of events, does it not follow that concrete nature includes cognitive relations? But Mr. Whitehead’s organic thesis is founded on the doctrine that all relations with which that thesis is concerned are internal. No less internal then must be the

relations we speak of as cognitive—for example those which are discussed under sense-perception.

And now for the bearing of this on the bifurcation of nature. If I am justified in so broadening Mr. Whitehead's distinction between the natural or physical organism and the concrete organism as to apply also to physical nature and concrete nature, then concrete nature (that is, nature "as a *whole*") includes all modes of mental relatedness. Concrete nature therefore includes that mode which is distinguishable as cognitive; and of this mode sense-awareness is an instance. How stands the matter on this basis?

Starting with his concept of nature as a closed system Mr. Whitehead finds among physicists a widely-accepted distinction between qualities called primary and qualities called secondary. He urges, as Berkeley had long ago urged, that there is no valid distinction. All qualities are, as he phrases it, "in the same boat." The two boats are respectively physical and mental. If some qualities are in one boat and some in the other, there is bifurcation of nature. But whereas Berkeley put all qualities, and nature itself, in the mental boat, Mr. Whitehead, in his *Concept of Nature*, put all qualities in the physical boat.

Within this physical nature-boat there is a community of organisms. We follow up, therefore, the story of organisms. Step by step we are led to the conclusion that the concrete organism includes the mental state. Does the "boat" analogy here break down? Not so, says Mr. Whitehead, if I rightly understand. But it requires some modification. There are still two boats; but he now calls them two worlds, the physical world-boat, and the mental world-boat. They are no doubt in relation. Still the relations *within* the physical world-boat are logically different from those *between* the two boats.

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Believing as I do in one concrete nature, physical and mental, there is for me just one boat. On my own terms, but not I fear on his, I agree with Mr. Whitehead that there are no psychic "additions." But this for me is because mental relations, no less than physical relations, are already there. I admit neither bifurcation of qualities, nor bifurcation of worlds. All forms of two-boater I reject.

Professor Whitehead's *Process and Reality* had not been published when this article was written. He there says (p. 411): "The separations of perceptual fact from emotional fact; and of causal fact from emotional fact, and from perceptual fact; and of perceptual fact, emotional fact, and causal fact, from purposive fact; have constituted a complex of bifurcations, fatal to a satisfactory cosmology."

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THE ORDER OF NATURE

IN the first chapter of Whitehead's *Science and the Modern World* he cites the following passage from Hume: "In a word, then, every effect is a distinct event from its cause. It could not, therefore, be discovered in the cause and the first invention or conception of it, *a priori*, must be entirely arbitrary."

From this Whitehead argues (p. 6), "If the cause in itself discloses no information as to the effect, so that the first invention of it must be *entirely* arbitrary, it follows at once that science is impossible, except in the sense of establishing *entirely arbitrary* connections which are not warranted by anything intrinsic to the natures either of causes or effects. Some variant of Hume's philosophy has generally prevailed among men of science. But scientific faith has risen to the occasion, and has tacitly removed the philosophic mountain." He goes on to maintain that the antecedents of this faith, "which is impervious to the demand for a consistent rationality," are to be sought in an instinctive faith in the Order of Nature.

It would seem that both Hume and Whitehead have missed something here, something that may perhaps be revealed if we inquire further into the nature and origin of this instinctive faith which is the "animal faith" of Santayana. The biologist would make an analysis of the

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situation which puts a different emphasis from that of the philosopher.

In the first place, the naturalist is inclined to doubt whether the contemporary philosopher has correctly interpreted the actual spirit of contemporary science in dealing with cause and effect sequences. "This strange contradiction in scientific thought" may prove to be a figment of the philosopher's imagination, not a scientific puzzle at all.

One of the chief tasks of natural science is the investigation of causal sequences. Unquestionably the effect is a distinct event from its cause, a novelty, and it may well be that the observer "in his first invention or conception of it" would be unable to discover the effect in the cause. The actual procedure is to build up the conception of the causal sequence *a posteriori*, that is, empirically, and in "his first conception" this relation may seem arbitrary to the observer. But further experience may show that behind every specific instance of a causal sequence there is not caprice, but order.

It does not follow that the connections thus empirically discovered are in themselves entirely arbitrary and "not warranted by anything intrinsic to the nature of causes or effects," as Whitehead assumes. In fact, we have good reason to believe that the contrary is true, not only by instinct but also by induction. The limited experience that we have of natural events is orderly as far as it goes, and this implies an order of nature underlying our experience.

Patrick in his stimulating book, *What Is the Mind?* follows Whitehead and says (p. 154) that evolution "cannot be defined as a series of orderly changes, for as far as the changes are evolutionary, they are disorderly." I maintain that the trend of evidence indicates that this is not true. Patrick himself seems to have doubts about it,

for he devotes his final chapter to a consideration of "Formative Forces," which, however, does not seem to the naturalist to rest on very substantial foundations.

The "jumpy" character of the emergents in the natural series—quanta to electrons, electrons to atoms, atoms to molecules, the inorganic to the vital, the unconscious to the conscious—and the new properties exhibited at each successive saltation impress us as disorderly only so long as we are ignorant of the exact details of the method by which the new and enlarged whole is fabricated from the simpler ingredients. These changes are not disorderly, or we could not discover laws of uniformity in the process and in some cases predict its course.

The various properties of the elements seemed disorderly until they were arranged according to their atomic numbers. Now their apparently erratic differences in atomic weight, valence and other properties are seen to arise in an orderly and intelligible way. They are none the less new properties for this. They were not latent or implicit in the electrons, needing only to be unfolded. They emerge or are created as novelties when the new atom of sodium or molecule of sodium chloride is fabricated. They inhere in the new whole thus built up, not in its discrete parts.

So mutations in organic evolution are novelties, but they are not disorderly in their appearance. They *seem* so to us until we learn the laws of their orderly appearance; and this we are slowly doing. For instance, it is now possible to induce mutations with a thousand-fold more frequency than they naturally occur by treating the germ cells with x-rays. Their emergence is not lawless.

The orthogenetic trend which so many naturalists see in evolution requires no mystical agency, nor are we lim-

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ited to metaphysical speculation about it. Some of the physical factors actually operative can already be recognized, as I have elsewhere pointed out.¹

Now when a causal sequence is firmly established empirically one of its essential features is *contingency*. The effect does not follow unless the cause is present, and given the cause the effect always follows. This again is an empirical datum, not an *a priori* postulate, and it suggests that the sequence of events which is observed does follow as it does because the connections observed are intrinsic to the process in question.

There is no contradiction here in our sophisticated modern science between an instinctive faith in the Order of Nature and a consistent rationality. The contradiction came earlier and in a different context, as will be pointed out shortly.

Whitehead's illuminating survey of the rise of the new mentality out of medieval scholasticism needs to be supplemented at both ends—the precursors and the consummation of the enlightenment—in order to include the full picture.

First, glancing backward, let us inquire into the origins of that instinctive faith in the Order of Nature to which he appeals. His argument here is satisfying and might be paraphrased somewhat as follows.

It is the common experience of all animate things that the events of their environments exhibit certain uniformities and periodicities (day and night, summer and winter, and so on) to which they must adjust. These adjustments primitively are instinctive, that is, they are performed unthinkingly, irrationally. In this instinctive form they are common to all organisms; they are part of the fundamental

¹ "Irreversible Differentiation and Orthogenesis," *Science*, vol. 51, 1920, pp. 621-625.

action system. They arise because the Order of Nature itself is not "entirely arbitrary," but lawful; and the organism's instincts are also orderly or lawful (adaptive, the biologist would say) because the organism must adjust to the order of external nature or he perishes.

Now, Whitehead appears to leap at one bound from this elementary instinctive type of adjustment to the Order of Nature quite up to the close of the medieval period and the dawn of the renaissance. But during the progress of those tedious thousands of years while mankind was learning how to observe and to think many things happened which have some bearing upon our problem.

When primitive man began to rationalize his instinctive adjustments his nascent mentality was incapable of making wide generalizations. His thinking, like that of his brutish ancestors, was mainly in terms of concrete experiences. The formulation of an abstract Law of Nature was beyond his capacity. Moreover, the more obvious uniformities of nature upon which such a law must be based were already inwrought into the fabric of his instinctive behavior. He did not need to think about them.

It was the variables, the unexpected, the unpredictable, that presented the acute problems of adjustment. These were always in the foreground of his conscious experience, as Whitehead clearly brings out. Abstraction of those common features of experience upon which our scientific laws are based was impossible for him—and unnecessary, for his instincts took care of that. But upon adjustment to the novel features of his environment, to the unforeseen contingencies of his precarious existence, his very life depended.

So, when he began to think about his world, his ideas were formulated in terms of the concretes of his own ex-

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perience, and particularly in terms of persons and their individualities. The personification of the unknowns, the unexplained, and the unpredictables naturally followed. So arose the primitive mythologies, which still abide with us.

A few rare geniuses were able to go farther and begin the process of abstraction and the formulation of natural laws, particularly the laws of thought as expressed in logic and mathematics. But, as Whitehead again reminds us, it was not until after the close of the medieval period that in popular thought law began to supplement magic and demonolatry.

The "strange contradiction in scientific thought" to which he refers—the contradiction between "arbitrary connections" in observed causal sequences and the Order of Nature—is nothing other than the rationalization of those primitive instincts that go back to our earliest biological ancestry and the replacement of crude animistic caprice by abstractions of wider reach, that is, the formulation of laws or uniformities abstracted from common experience by a rational process. This came late because the unreasoned instincts were adequate for primitive conditions and in later stages the traditional mythologies were adequate.

Not until these irrational mythologies were critically examined and (in some cases) found inadequate to meet the needs of an awakened interest in Nature and in Man as objects of direct experience were the mythological faiths questioned; and by that time the myths and the dialectic employed in reasoning about them were so deeply entrenched in scholastic and popular psychology that the awakening was a true mental and social revolution.

When an irrational taboo, a long-established social convention, or a sanctified religious dogma is thus critically evaluated in terms of recent innovations of scientific, social

or personal experience and is found lacking in rational sanction or in appropriateness to the changed conditions, then there is a real conflict, a struggle that stirs the personality and the community organization to their depths. The birthpangs of social regeneration come in rhythmic pulses, usually marked by the careers of some one or more dominant personalities—Moses, Christ, Galileo, Luther, Darwin, Lincoln, and the rest.

At the present moment we are obviously passing through such a period of storm and stress. The social fabric is trembling under the strain of conflict between hallowed social and religious codes of conduct and belief and a newly awakened critical spirit that insists upon asking, Why? If no satisfying answer can be given to that question, flaming youth will throw out the discarded tatters of outworn taboo and dogma without hesitation or compunction. They have already done it with some of the most venerable articles of the code of social conventions.

Our intuition, or "animal faith," is no more infallible than our mystical faith based on religious or metaphysical dogma. The present demand is for a faith—a real and effective faith—which has rational sanction, or at least is not contradicted by common and scientific experience. This is not an unreasonable demand.

In its modern form, then, the contradiction in scientific thought is not between arbitrary connections of cause and effect in logic or dialectic and the Order of Nature, but between arbitrary or capricious mythologies and the Order of Nature.

True, we cannot predict effects from causes in advance of experience. But, having observed a sufficient number of uniformities in a particular series of natural events, we

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generalize these *ex post facto* and formulate the law. The Order of Nature as envisaged by modern science is, therefore, an induction of a very sophisticated sort, an induction that came only very recently in the history of human thinking.

This induction met great resistance, not because experience of nature was disorderly or arbitrary, for our experience of contingency always implies an order, not because instinct was opposed to experience, but because for more than two thousand years attention was directed to the variables, not the uniformities of experience and the rationalization was in terms of an uncritical mythology built up around these variables and unpredictable. These habits of scholastic rationalization in terms of dialectic rather than direct experience were very tenacious and with most of us they are still dominant despite upwards of three hundred years' experience with the scientific method and its quickening effects.

But as soon as the thinking public in general arrives at a stage of culture when abstractions can be grasped and used effectively as tools of adjustment, then law supplants magic and progress in the conquest of nature is accelerated.

When a sufficient number of these laws of uniformity are within our grasp we can begin to formulate laws of change, of growth, of evolution, and so on. We see that novelties are not lawless, but creative evolution is natural evolution. This marks another great step in advance; for now we can not only predict what will happen in the future if conditions do not change, but we can begin to see something of the trend of events in our own changing world and perhaps predict a revamping of the order of events which has not yet begun.

We can go beyond mere prediction, for we can take a hand in the control of the farther course of events ourselves. Knowing some laws of heredity, variation, mutation, and evolution, we can create new species of wheat or cattle or men by deliberate intent. We can foresee desirable ends and at times shape the march of events toward those ends. This puts in our hand the apparatus for the creation of a new civilization.

Though we cannot predict effects from causes of which we have meager experience, yet when our experience is sufficiently enlarged to enable us to set these causes in their orderly places in the flow of events as a whole, to see their inter-relationships, and to formulate laws of change, then we can see that what at first appeared to be an "entirely arbitrary" connection between cause and effect is in reality not arbitrary or lawless. For the causal sequence itself is naught but the expression of an underlying Order of Nature which is the most basic reality of our cosmos.

That Order to which we adjusted at first instinctively as one of the essential conditions of our existence now is envisaged intelligently. To our instinctive reactions we now add rational interpretation and control; and we go further. By observation and experiment we widen the reach of our experience and discover new secrets of nature and hitherto unsuspected features of the Natural Order.

This is the scientific method. There is nothing about it which is in contradiction to the Natural Order, for our modern concept of the Natural Order is the legitimate offspring of the scientific method.

Now a word further about these variables around which this argument is built up. Toward the close of his life Darwin said that the discovery of the laws of organic variability was one of the greatest desiderata of his time.

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It still is, not only in biology but in cosmology. Change, the introduction of novelties in the Natural Order, creative evolution, these have given biologists and philosophers a world of trouble.

A change injected into the Order of Nature from the outside or a change arising as an isolated and unrelated event would be by definition unnatural and natural science would be quite helpless in the face of it. But we have no experience that requires belief in such arbitrary or capricious changes.

All unexpected happenings and all the novelties in our experience of which we have even approximately adequate knowledge are found to be knit into the Natural Order in law-abiding patterns. They have natural parents and natural progeny, and often we can trace the natural sequence of their generation. Everything that happens in our world of experience is in a sense a novelty. But it does not "happen" capriciously. It is caused; and the web of the flowing network of the causal sequence may reach out to the ultimate limits of our natural cosmos and there is no reason to assume that it goes beyond those limits.

One by one the "arbitrary" events of limited experience and crude thinking are taking their places in the Natural Order. The thunder bolts have been snatched from the hand of Jove and used to run the machinery of civilization. Even in the organic realm we can now see that Darwin's cry was both a hope and a prophesy. The prophesy has not yet come into complete fulfilment, but the hope burns with a clearer flame.

Perhaps of all the events in our experience the one that seems most arbitrary and lawless is a human volition. It has always been regarded as the typical caprice. Yet even here we can in favorable instances trace some of the

threads of a causal sequence. Is it better to assume that the parts of the pattern that we cannot see are lawless or supernatural and hence inaccessible, or to go on looking for the rest of them in the Natural Order? In so far as we can find them here, we can hope to be able to understand their mechanism and to improve and control it.

The problem of the nature of self-control—which with us is largely voluntary control—is the biggest problem of our time. Upon its correct solution depends our hope of the survival and further progress of human culture. If this problem lies within the Natural Order, we can hope to solve it and to apply our knowledge to personal and social betterment. If it does not—God help us! Nobody else can.

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PHILOSOPHY AND EMBRYOLOGY: PROLEGOMENA TO A QUANTITATIVE SCIENCE OF DEVELOPMENT (I)

I. *Physico-Chemical Embryology*

THE penetration of physico-chemical concepts into embryology is not likely to be entirely peaceful. "In experimental embryology," it has been said, "concepts borrowed from the physical sciences do not admit of calculations being made, and until they do they are not really playing the same rôle as they do in the sciences from which they have been borrowed and for which they were devised." "Nothing is more clear," says another writer, "in chemistry and physics than that identical results follow upon identical causes. Introduce a disturbing element, even a small one, into your experiment, and the experiment will fail. Such is not the case with the developing egg." W. McDougall, among many others, has also endowed the egg with good intentions. "The embryo," he says, "seems to be resolved to acquire a certain form and structure, and to be capable of overcoming very great obstacles placed in its path. The development of the forms of organisms seems to be utterly refractory to explanation by mechanical or physico-chemical principles." Finally, J. A. Thomson goes further than them all, and does not hesitate to say "It is a mere impious opinion that development will one day be described in terms of mechanics." Chapter four

of his Gifford Lectures illustrates the antagonistic attitude to physico-chemical embryology in its most acute form.

It can hardly be a coincidence that so many among the great embryologists of the past have also some claim to philosophical eminence, or at least were men of strongly philosophic minds. It would be absurd to support this opinion by citing Aristotle, but it holds no less obviously true of William Harvey, whose book on generation is full of thoughts about causation, and in the cases of K. E. von Baer, Ernst Haeckel, Wilhelm Roux, Hans Driesch, d'Arcy Thompson, and J. W. Jenkinson, there is no doubt about it. It is not really surprising, for of all the strange things in biology surely the most remarkable is the transmutation inside the developing egg, when in three weeks the white and the yolk give place to the animal with its tissues and organs, its batteries of enzymes and its delicately regulated endocrine system. This coming-to-be can hardly have failed to lead in the minds of those most intimately acquainted with it to thoughts of a metaphysical character. Nor, it seemed, did those who worked on it do much to diminish its wonder. "Neither the schools of physicians," as Harvey said, "nor Aristotle's discerning brain, have disclosed the manner how the Cock and its seed, doth mint and coine, the chicken out of the egg." Or, in the words of Erycius Puteanus, "I will neglect gold, and will praise what is more precious than any metal, I will despise feasts, and will set forth praises of something better than any food or drink. If you would know of what it is that I intend to speak, it is the egg; men marvel at the sun, at meteors flung from heaven, at stars swimming therein, but this is the greatest of all wonders." Here, however, there is one significant thing. It is that the very chapter of Harvey's book in which the preceding remark

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is found has as its heading "The Efficient Cause of the Chicken, is hard to be found out." It certainly was, but the right clue was in the heading to that exercitation.

This peculiar association of embryology with philosophy, then, makes it necessary to defend from a theoretical angle the extension of the domain of physics and chemistry over embryology. No mention will be made of technical or detailed problems, as Bertalanffy, for instance, has done in his book on ontogenetic theory, for physico-chemical embryology hand in hand with its senior colleagues, experimental embryology and genetics, will easily be able to tackle them. This paper is written rather to remove the spiritual stumbling-blocks which encumber the first steps of the infant science. For the view that biology is, after all, only complicated physics is frequently questioned, and many biologists, having insufficiently considered the nature of the scientific method, think it likely that the discoveries of modern times may allow of some other basis for biology than an extended mathematical physics, and that the scientific method may rightly be in some obscure way different in biology from what it is in chemistry. If, then, the concepts of physics and chemistry are to be extended to a field of biology where they have never before received more than a conventional and formal reverence, the aim of its studies must be that expressed by T. H. Huxley when he said "Zoological Physiology is the doctrine of the functions or actions of animals. It regards animal bodies as machines impelled by certain forces and performing an amount of work which can be measured and expressed in terms of the ordinary forces of nature. The final object of physiology is to deduce the facts of morphology on the one hand and those of ecology on the other hand from the laws of the molecular forces of matter." It may be regarded as very noteworthy that Huxley here puts mor-

phology as secondary to physiology and as it were derivable from it; he does not place morphology and physiology on two high places, neither "afore or after other," as has so often been done, but he plainly states his view that the anatomical aspect of animals, their external and internal forms, could be deduced from the interplay of physico-chemical forces within them. The idea of the primacy of function seems always to have two meanings, firstly, the Epicurean-Lucretian one which Huxley uses here and Roux so brilliantly developed, in which shape is regarded as the outward and visible sign of the properties of matter itself, and secondly, the Aristotelian one emphasised by Lamarck's writings in the eighteenth century, and in our time by E. S. Russell's great work *Form and Function*, in which psychical factors are introduced as the essential elements in the ultimate analysis of shape. In both these interpretations, function has the priority over form, but the basis of function is the point of difference. Some thinkers still regard the predominance of the former, or physico-chemical, attitude, among working biologists with suspicion: J. H. Woodger is perhaps their most incisive spokesman. In their view, physiology and morphology are categorical, and the latter is emphatically not reducible to or derivable from the former. The two spheres of study represent, for them, correlative and immiscible disciplines, morphology aiming ultimately at solid geometry, physiology at causation. *Rerum cognoscere causas* would thus not be the basic desire of the scientific mind. Woodger objects to the view of "the ovum as a kind of chemical device wound up and ready to go off on receipt of a stimulus, the task of the causal morphologist being to disentangle the complex of events which constitute the unwinding process." He complains that in this physico-chemical view no account is taken of the past history of

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the race which is left to genetics, again a causal discipline. To some extent these opinions spring from a conviction that the analytical method is inapplicable to a living being because it is an organism, and of that there is more to be said. But they also arise from a profound unwillingness to subsume biology under physics and a desire to uphold what is often called "the autonomy of biology."

2. *The Historical Perspective*

That the older embryologists awaited the extension of physico-chemical conceptions to embryology is no mere matter of conjecture. Until the mechanical theory of the universe had been consolidated by the "corpuscularian philosophy" of the seventeenth century, it would be useless to look for illustration of this, but by 1674 John Mayow was tracing the part played by the "nitro-ærial particles" in the development of the embryo, and in 1732 Hermann Boerhaave was discussing chemical problems with explicit reference to embryonic development. Then, when the second decade of the nineteenth century had nearly gone, von Baer, perhaps the greatest of all embryologists, was careful to preface his *Entwicklungsgeschichte* by a careful account of all that was known about the chemical constitution of the egg, and that although his philosophical inclinations were deeply vitalistic, and even his experimental interests morphological. In Roux, of course, this future reference came out explicitly, and the extension of biochemistry into embryology was allowed for the foreseen.

Embryology before Harvey, however, was rigidly Aristotelian, a statement the meaning of which Santayana has lucidly explained. "Aristotle," said he, "distinguished four principles in the understanding of Nature. The ignorant think that these are all equally forces producing

change, and the cooperative sources of all natural things. Thus, if a chicken is hatched, they say that the Efficient Cause is the warmth of the brooding hen, yet this heat would not have hatched a chicken out of a stone, so that a second condition, which they call the Material Cause, must be invoked as well, namely, the nature of an egg; the essence of eggness being precisely a capacity to be hatched when warmed gently—because, as they wisely observe, boiling would drive away all potentiality of hatching. Yet, as they further remark, gentle heat-in-general joined with the essence-of-eggness would produce only hatching-as-such and not the hatching of a chicken, so that a third influence, which they call the Final Cause, or the End-in-view, must operate as well, and this guiding influence is the divine idea of a perfect cock or a perfect hen presiding over the incubation and causing the mere eggness in the egg to assume the likeness of the animals from which it came. Nor, finally, do they find that these three influences are sufficient to produce here and now this particular chicken, but are compelled to add a fourth, a Formal Cause, namely, a particular yolk, a particular shell, and a particular farmyard, on which and in which the other three causes may work, and laboriously hatch an individual chicken, probably lame and ridiculous despite so many sponsors." The Aristotelian account of causation could not be better expressed. Santayana puts this description of it into the mouth of Avicenna in his imaginary dialogue, and makes him go on to say "Thus these learned babblers would put nature together out of words, and would regard the four principles of interpretation as forces mutually supplementary combining to produce material things; as if perfection could be one of the sources of imperfection or as if the form which things happen to have could be one of the causes of their having it. Far differently do these

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four principles clarify the world when discretion conceives them as four rays shed by the light of an observing spirit." In this last observation we may perhaps trace the germ of the Copernican revolution in philosophy effected by Kant, if we may take it to enclose the idea of the activity of the experiment subject in all perception.

In science generally, however, the Aristotelian conceptions went without serious contradiction, and thus formed the framework for all the embryological work that was done, as, for instance, by Albertus Magnus. Owing to its association with the idea of the plan of a divine being, the final cause tended in the middle ages to eclipse the others. In the seventeenth century this feeling is well shown in a remarkable passage, which occurs in the *Religio Medici* of Sir Thomas Browne: "There is but one first cause, and four second causes of all things; some are without Efficient, as God; others without Matter, as Angels; some without Form, as the first matter; but every Essence created or uncreated, hath its Final Cause, and some positive End both of its Essence and Operation; this is the cause I grope after in the works of Nature; on this hangs the providence of God; to raise so beauteous a structure as the World and the Creatures thereof, was but his Art; but their sundry and divided operations, with their predestinated ends, are from the Treasure of his wisdom. In the causes, nature, and affections of the Eclipses of the Sun and Moon there is most excellent speculation, but to profound farther, and to contemplate a reason why his providence hath so disposed and ordered their motions in that vast circle as to conjoyn and obscure each other, is a sweeter piece of Reason and a diviner point of Philosophy; therefore sometimes, and in some things, there appears to me as much Divinity in Galen his books *De Usu Partium*, as in Suarez *Metaphysicks*: Had Aristotle been as curious

in the enquiry of this cause as he was of the other, he had not left behind him an imperfect piece of Philosophy but an absolute tract of Divinity." This was written in Harvey's time, and in Harvey's thought the four causes were still supreme; his *De Generatione Animalium* is deeply concerned with the unravelling of the causes which must collaborate in producing the finished embryo. But the end of their domination was at hand, and the exsuccous Lord Chancellor, whose writings Harvey thought so little of, was making an attack on one of Aristotle's causes which was destined to be peculiarly successful. It would be superfluous to quote his immortal passages about the "impertinence" of final causes in science, for they cannot but be familiar to all scientific men. Bacon demonstrated that from a scientific point of view the final cause was a useless conception; recourse to it as an explanation of any phenomenon might be of value in metaphysics, but was pernicious in science, since it closed the way at once for further experiments. To say that embryonic development took the course it did because the process was drawn on by a *vis a fronte*, by the idea of the perfect adult animal or by intentions resident in the egg, might be an explanation of interest to the metaphysician, but since it led to no fresh experiments, it was nothing but a nuisance to the man of science. Later on, it became clear also that the final cause was impertinent in science owing to its inexpressibility in terms of measurable entities. From these blows the final cause never recovered. The seventeenth century was the time of transition in these affairs, and in such books as Joseph Glanville's *Plus Ultra* and *Scepsis Scientifica*, for instance, and Thomas Sprat's *Defence of the Royal Society*, the stormy conflict between the "new or experimental philosophy" and the Aristotelian "school-philosophy" can be easily followed. Before long another of

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the scholastic causes had to go. Bacon, indeed, had expressly excluded the formal cause from Physic, and it subsequently disappeared as thinkers realised that scientific laws depend on the repeatableness of phenomena, and that anything unique or individual stands outside the scope of science. Its final farewell was given it by Mill in his logic. Thus in the case of the developing egg, the formal (the particular farmyard, etc.) and the final causes are scientifically meaningless, and if it were desired to express modern scientific explanation in Aristotelian terminology, the material and efficient causes would alone be spoken of, essence-of-eggness being a "chymical matter" as well as the heat of the brooding hen.

The complexity of living substance, however, is such that many minds find it difficult to accept this physico-chemical account as the authentic scientific way of looking at it. This is doubtless due in part to an erroneous notion, which is yet very tenacious of existence, that the mechanical theory of the universe must, if accepted at all, be accepted as an ultimate ontological theory, and so involve its supporter in one of the classical varieties of metaphysical materialism. It cannot be too strongly asserted that this is not the case. To imagine that it is, is to take no account of the great space that separates us from the last century; how great has never been more clearly expressed than by William James. "When the first mathematical, logical, and natural uniformities," he said, "the first Laws, were discovered, men were so carried away by the clearness, beauty, and simplification that resulted that they believed themselves to have deciphered the eternal thoughts of the Almighty. His mind also thundered and reverberated in syllogisms. He also thought in conic sections, squares, and roots and ratios, and geometrized like Euclid. He made Kepler's laws for the planets to follow, he made ve-

locity increase proportionately to the time in falling bodies; he made the laws of the sines for light to obey when refracted; he established the classes, orders, families, and genera of plants and animals, and fixed the distances between them."

Far different is the account of itself which science has since learned to give, and though there are many variations of this account, the notion of natural law as conceptual shorthand is common to them all. But this change of attitude is not a revolt against thought as such, or against reason as such; it is only a loss of belief in the literal inspiration of the formulae proper to science. It would be just as extravagant to claim that the scientific investigator of the 20th century sets down absolute truths in his laboratory notebook, and, armed with an infallible method, explores the real structures of an objective world, as it would be fantastic to claim that Jehovah dictated an absolute code of the good to Moses on Mount Sinai. To say that the development of a living being can best be described in a mechanical way is not to say that it *is* mechanical and nothing else. The physico-chemical embryologist is not committed to any opinion on what his material really is, but he is committed to the opinion that the scientific method is one way of describing it, and that it is best to apply that method in its full rigour if it is to be applied at all. In other words, and following the train of thought of William James, he does not assert that the courts of Heaven as well as those of our laboratories resound with expressions such as "organisers of the second grade," and "so many milligrams per cent." The mechanical theory of the world, which is, as many believe, one of the ultimate types of human experience, can no longer be considered as necessarily involving the exclusion of other theories of

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the world. Or, put in another way, it is a theory of the world, and not a pocket edition of the world itself.

But before bringing forward any arguments in support of this attitude and in defence of physico-chemical embryology, it will be well to consider briefly those theoretical tendencies in modern biology which go together under the loose and inexact adjective "neo-vitalistic," for their influence in scientific thought has been far-reaching. To deal critically with them is not a waste of time, for were we to adopt any one of them, we should find that the notion of embryology as complicated biophysics and biochemistry would have to be abandoned, and quite other means of approach (never, indeed very well defined) would have to come into operation.

A general survey of neo-vitalistic theories makes it possible to classify them under the heads of Hormism, Finalism, Dynamic teleology, Organicism, and Emergence. I shall bear in mind, in discussing them, the close practical connection which each of them has to the needs of modern embryological research, for they represent, as it were, the different ways in which it is possible to be an embryologist.

3. *The Difficulty of Hormism*

Hormism, or Psychobiology, may be dealt with in a few words. Chiefly supported by Wagner in Germany, and by E. S. Russell in England, it holds that a physiological tale—to use Lloyd Morgan's terminology—cannot be told separately from a psychological tale. Instead of expressing living processes in terms of physical causes and effects, the hormists wish to regard unconscious striving as the essential urge in life, and such conceptions as food, rest, fatigue, etc., as irreducible biological categories. These thinkers do not sufficiently acknowledge their debt to Galen of Pergamon who as early as 170 A. D., put forward an

essentially similar conception as the basis of his biology. In the treatise *On the Natural Faculties* he says, "The cause of an activity I term a faculty. . . . Thus we say that there exists in the veins a blood-making faculty, as also a digestive faculty in the stomach, a pulsatile faculty in the heart, and in each of the other parts a special faculty corresponding to the function or activity of that part." Galen also said, "We call it a faculty so long as we are ignorant of the cause which is operating," but he never suggested any such underlying cause, and seems to have thought it impossible to ascertain. So do the hormists of the present time. According to them the actions of protozoa are to be described in terms of avoiding responses, seeking responses and the like, language which, as they claim, is much simpler than the complex terminology of surface tension and molecular orientation. Everything, of course, depends on what you mean by simple. To say that a protozoon seeks the light is evidently more naive than to say that a bimolecular photochemical reaction takes place in its protoplasm leading to an increase of lactic acid or what not on the stimulated side, but since the latter explanation fits into the body of scientific fact known already, it is open to the biochemist to say that, for his part, he considers the latter explanation the simpler. It is, in fact, simpler in the long run. Psychobiology or Hormism differs from the other forms of neo-vitalism because it insists on retaining "commonsense" explanations in biology as categories of biological thought beneath which it is impossible to go. It dismisses the entelechy of dynamic teleology, on the ground that it acts, as it were, in addition to the mechanistic schema, accepting the latter fully but interfering in it. It resembles much more Finalism and Organicism, but lays stress rather on the unconscious striving force which seems to animate the carbohydrates,

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fats, and proteins when they form colloidal solutions. It resembles the Behaviourism of Watson superficially by emphasising animal behaviour, but it fundamentally differs, for it asks the question—Does an animal see the green light and the red light in this experiment as we do, or does it see them as two shades of grey as colourblind people do? While the behaviourist asks—Does it respond according to difference of light-intensity or difference of wave-lengths? it recurs continually to psychical factors. Samuel Butler, for instance, one of its patristic writers, said, "I want to connect the actual manufacture of the things a chicken makes inside an egg with the desire and memory of the chicken so as to show that one and the same set of vibrations at once change the universal substratum into the particular phase of it required and awaken a consciousness of and a memory of and a desire towards this particular phase on the part of the molecules which are being vibrated into it." "The Hormist contends," says Lloyd Morgan, "that something which is very difficult to distinguish from a 'plan-in-mind' on the part of the embryo chick or rabbit does freely determine the course of events in specific growth from egg to adult. This, I urge, is a metaphysical hypothesis which goes beyond biology or psychology as branches of science." Lloyd Morgan is right: after reading E. S. Russell's "We need to look at living things as active, living, passionate beings like ourselves, and to seek in our morphology to interpret as far as may be their form in terms of their activity," what is there to say except, *C'est magnifique, mais ce n'est pas la science?*

4. *The Stumbling-Block of Finalism*

Finalism and Dynamic teleology are closely connected, for both of them embody an attempt to go back to the Aristotelian inclusion of the final cause as an integral es-

sential of scientific method, and to regard the Baconian attitude to teleology as a mistake. They solve Kant's Antinomy of the teleological judgment simply by deleting the proposition, and leaving the counter-proposition. They are weakest on their practical side, for their supporters do not suggest any alterations which might be made in scientific method, although their fundamental assumptions plainly require it. The principal representative of Finalism is Eugenio Rignano, and Dynamic teleology has been for the most part upheld by Hans Driesch.

Rignano, in his *Qu'est-ce-que la Vie?* and his *Biological Memory* has contended that, though the mechanical concept of the universe may be perfectly satisfactory as a description of the world of physics, yet animals and plants show so much purposiveness that mechanical categories are absolutely inadequate for them. Biology, therefore, cannot be complicated physics and chemistry, but must be something *sui generis* and with its own methods and laws. "The long debate between vitalists and mechanists," he says, "in attempting to give an explanation of life, cannot lead to any conclusion unless that fundamental characteristic common to all vital phenomena of presenting a purposive, teleological, or finalistic aspect in their most typical manifestations is first thoroughly examined. . . . Even if the organism could be explained as a physico-chemical machine, there would still remain to be explained the most fundamental thing—how the machine constructed itself. The purposiveness of the ontogenetic development is too evident to be denied. It results from the convergence of manifold morphogenetic activities to one sole end, that is, to the formation of a marvellous functional unity, every part of which serves to maintain the life and guarantee the well-being of the whole. The embryo in its development manifests at every stage a 'harmony of composition'

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as Driesch calls it, which has a touch of the marvellous; parts and elements of an organ develop independently, but when they have finished their development they are found to fit together perfectly like the parts of a machine and the one so answers to the other that they unitedly form one complex organ. Thus the mouth and intestine of the sea-urchin begin their development at two points distant from each other and develop independently, but as they grow the one moves towards the other, so that when development is ended they perfectly fit together and form a single canal." This passage illustrates the line of argument found throughout Rignano, and I will not remark on it further than to draw attention to the mention of the marvellous in it, another hint, if any were needed, of that strain of misplaced "numinous instinct" which seems to be present in all biological vitalists. *Omnia exeunt in mysterium* would seem to be a discouraging maxim for the scientific worker. "The direction of ontogenetic development," Rignano goes on to say, "toward a predetermined end is also influenced by the fact that the embryo overcomes early disturbances which might deflect it from its course. Ontogenesis thus seems marshalled by some occult intelligence or entelechy in the same way that the construction of a machine and the direction of its work is presided over by the mind of the engineer."

Now Rignano's arguments are open to grave objection on two main grounds, firstly, that he regards biology as suffering more than physics from the teleology of things, and secondly, that he wishes to bring the concept of purposiveness back into natural science.

The first of these is inadmissible on both philosophic and scientific grounds. Bernard Bosanquet best expresses the former attitude. He was led to his conclusions by the conviction that Ward and other opponents of scientific

naturalism had gone too far in their polemics against the mechanical theory of the universe, and had rested the case for teleology only "on the capacity of the finite consciousness for guidance and selection." This he considered a mistake. "Things are not teleological," he said, "because they are *de facto* purposed but necessary to be purposed because they are teleological." "The foundations of teleology in the universe are far too deeply laid to be accounted for by, still less restricted to, the intervention of finite consciousness. Everything goes to show that such consciousness should not be regarded as the source of teleology but as itself a manifestation falling within wider manifestations of the immanent individuality of the real." Bosanquet proceeds, "The contrast, then, of mechanism with teleology, is not to be treated as if elucidated at one blow by the antithesis of purposive consciousness and the reactions of part on part. It is rooted in the very nature of totality, which it regards from two complementary points of view, as an individual whole, and as constituted of interacting members." From a more scientific angle objection comes from Lawrence Henderson, whose book *The Fitness of the Environment*, probably the most important contribution to biological thought in this century, is never referred to by the writers of Rignano's school. It cannot now be necessary to recount how he examined the question of the finality of our present scientific knowledge, and, judging that it was considerable, went on to inquire into the properties of the elements and compounds principally associated with life. His conclusion was that living animals and plants exist in an environment just as fitted for them as they are for it, that the Darwinian concept of fitness, works, indeed, both ways, and that there is a reciprocity between organism and environment so that every teleological action performed by an individual organism

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bears upon it the image and superscription of universal teleology. Thus the conclusion of the thought of Bosanquet and Henderson was that, though teleology is a metaphysical conception which it is impossible to do without, yet any limitation of it to or special association of it with, living organisms, is inadmissible. The question remained, and still remains, what has teleology to do with science?

This point has been approached best by J. W. Jenkinson with his usual clarity. "Those who uphold teleological doctrine," he said, "seem to have fallen into a confusion between two different things, the formal and the final cause. The material, efficient, and formal causes, if we mean by the last the idea of the effect in the mind of a sentient being, all precede in time the occurrence of the effect; and this kind of teleology is not, as it is asserted to be, a doctrine of final, but one of formal causes. The final cause stands for the use to which an object is to be put, the effect it will produce, the function it will perform, which obviously succeed in time the existence of the object itself. The final cause, then, cannot be taken as ever determining in time the existence of the object itself, and is therefore a conception which belongs not to science but to metaphysics. The only necessary conditions of a phenomenon ascertainable by science are those material and efficient causes which precede it." Or, as Streeter puts it, "If there is purpose in nature, we ought not to expect science to reveal it. Purpose is activity the direction of which is determined by an end, that is, by an apprehension of quality or value. But quality cannot be measured, and therefore from its essential nature it—and along with it purpose—lies outside the sphere of science." Or, finally, to go straight to the fountain-head, "If I say," wrote Kant, "that I must judge according to merely mechanical laws, of the possibility of all events in material nature and consequently of all forms

regarded as its products, I do not therefore say: they are possible in this way alone. All that is implied is: I must always reflect on them according to the principle of the mere mechanism of nature and consequently investigate this as far as I can; because unless this lies at the basis of investigation there can be no proper knowledge of nature at all." Purposiveness, in fact, is not a conception which interlocks with quantitative treatment; that mathematical expression of relationships which is the ideal type of all science has here nothing upon which to impinge, and the pulling force, perpetually going on before, eludes and must always elude, if this analysis is correct, the advancing web of mechanical explanation.

JOSEPH NEEDHAM.

CAMBRIDGE, ENGLAND.

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DETERMINISM AND MODERN PHYSICS

THE history of modern thought is in its main features the history of natural science. In that Aristophanic chorus of many voices it takes no very keen ear to detect the dominance of those to which science has given the keynote; and even the dissonant strains are determined by that against which they rebel. Either as pro-scientific or anti-scientific Western philosophy has revolved about the ever increasing mass of natural knowledge. Art, religion, poetry, as well as pure philosophy, in so far as they possess vitality today, derive their significance from science; they either accept or protest against a world of thought and action which is the creation of the scientific spirit. Like Emerson's Brahma, science can say:

They reckon ill who leave me out:
When me they fly, I am the wings.

On the face of things, the contest is merely the modern version of an ancient feud—between the lovers of concrete fulness and the abstractionists, the Goethes and Newtons, or, as William James so neatly puts it, between the "thick" and "thin" philosophies. But though this is true in a measure, the dichotomy is not so simple. That which complicates it, and at the same time exacerbates the conflict, is the success of science, particularly of the science of physics. This has worked in two ways.

First, by enlarging man's power over matter, it has made possible new modes of life, and these activities have reacted on our ways of thinking. In this practical sphere it is not a matter of rival philosophies; we have rather a discord between the round of our daily life and our traditional creeds. The history of the so-called "warfare" between science and religion is but a chronicle of street riots, sporadic affrays between the native inhabitants and newcomers who were in possession of the country before their presence had been noted. The Fundamentalist never made a serious fight over the operations of the Weather Bureau; he consults his doctor when sick; he takes his car to a mechanic for repairs. He turned frantically on Darwin—two generations ago in England, and again recently in America—as if the publication of the *Origin of Species* had constituted the first attack on his faith. The vehemence of this protest was itself symptomatic of the inner discord; the whole Fundamentalist movement might be described, in the jargon of the psycho-analysts, as the expression of an inferiority complex by organized religion. For, long before Darwin, the western world had built up a civilization and a mode of daily life in which a definitely anticipated future took the place of complete uncertainty as to the behavior of an arbitrary despot. That mode of thought which flourished in the intellectual climate of the middle ages has a hard struggle to survive in this day of machines and popular government. The transition from an age in which little seemed knowable, but everything important known, to one offering endless possibility but no finality of knowledge, has required much hardihood of those who faced it consciously. It is small wonder that the common man, like the sailor in the crew of Columbus, is seized with sudden panic on realizing the voyage on which he has embarked.

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But there is a second way in which the success of science has reacted more directly on philosophy. Considered simply as a body of abstract knowledge, the science of physics towers above all other creations of the modern mind. With the work of Newton and his followers began a new era of speculative thought, and the revolution thus inaugurated has run its course independently for the most part of the increase of mechanical inventions and of the industrial expansion which was its later fruit. Without minimizing the importance of the Copernican theory in the history of philosophy, I think it may be claimed that the effect of the *Principia* has been more profound. The adjustments demanded by the former concerned mainly the cruder parts of theology,—the location of heaven and hell, the naive anthropomorphism of the Old Testament and the literal acceptance of its cosmology. These adjustments could be made without impairing any essential attribute of the divine power; indeed they might be considered as enhancing it. With the appearance of the *Principia*, on the other hand, the conception of unchanging natural law, of inexorable order, passed from the almost exclusive possession of a small group of scientific workers and became the common property of thinking men. The science of mechanics was brought very quickly to practical perfection, and this most perfect part of the edifice of science became the pattern toward which all the other builders strove. Not only were the laws of mechanics of great simplicity and elegance, but in the motion of the planets they were exemplified on so grand a scale, both of space and time, that the imagination of men took fire. We all know what vistas opened out to the eyes of eighteenth century rationalism; how its enthusiasts looked forward to a world which under the dominion of mathematics would be foreseeable

in all its details. The intoxication of that first triumph has now long subsided, but the concept of law has remained, and today we are able to appraise more exactly the extent of the wreckage it has wrought among the older beliefs.

The devastation has been wholesale. The appalling vastness of the Copernican universe could have been borne with some equanimity; the oppressive order of the Newtonian has swept all before it. God himself has been all but dethroned; from his position of absolute ruler and active participator in the daily lives of men he has been reduced to the status of a constitutional monarch, a figure-head allowed to reign only on condition that he does not interfere. That which happens is the only thing that could have happened; our finite eyes may read the book prepared for them, but that book is already complete from title-page to colophon. Calvinistic theology may save the dignity of God by considering natural laws as his self-imposed limitations, but the old intimate relation between man and his Creator—that relation which in the middle ages flowered so gloriously in the great cathedrals—has vanished from the vision of those who have tried in all honesty of soul to see God through nature. The spirit of man is today enmeshed in a web of fine-spun deterministic logic, and each advance of science seems to add another strand for our imprisonment.

This, determinism, is the bitter poison in the cup of knowledge, paralyzing man's efforts, changing to gray the green and gold of life, its music to mocking laughter. It was in the nineteenth century that the revolt against the determinism of science took shape. The violence of the attack on Darwin was the expression not merely of a resentment of the moment, but of a long accumulation of in-

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juries. The *Origin of Species* gave the excuse for an outburst long overdue. Whatever we may think of Tennyson as a poet, we must set it down to the credit of his intelligence that in *In Memoriam* he saw the real issue,—not the simian ancestry of man but the blind mechanism of the cosmic process. But we find a better, though subtler, expression of the revolt in Edward Fitzgerald. Instead of the *Credo quia impossibile* of *In Memoriam* we have, in his rendering of the Rubaiyat, an outward acceptance of the new philosophy,—“The Ball no question makes of Ayes and Noes”; but it is the acceptance of an insult which one is powerless to avenge.

A Moment's Halt—a momentary taste
Of *Being* from the Well amid the Waste
And Lo!—the phantom Caravan has reach'd
The *Nothing* it set out from—Oh, make haste!

Into those last three words are breathed his utter scorn for “this sorry scheme of things,”—a scorn which found its last expression in his defiant epitaph: “It is He that hath made us and not we ourselves.” All that is left to man is sardonic laughter and the creation of beauty. In Thomas Hardy we find a similar note. His characters are the characters of Greek tragedy, puppets of circumstance to whom the artist accords the pity that the cosmos withholds. It is not that, like Tennyson, these writers were consciously reacting to a formulated philosophy; rather they struggled for breath in the atmosphere into which they were born.

But besides the revolt expressed by art and literature, there has been a philosophic reaction. As representative of this dissident attitude we may take the philosophies of James and Bergson. It is no accident that the strongest protest should come from these “thick” philosophers; it is their sense of the unexpressed, of the left-out in the scien-

tific scheme that provokes it. If, with the absolutists, we are content to whittle concrete reality down to an abstraction, one abstraction is as good as another; such a mind can find complete satisfaction in the proposition that determinism is the fullest freedom, or some equally fatuous paradox. For William James it is the fullness of life to which science denies expression, and which must have its due.

"If a certain formula for expressing the nature of the world violates my moral demand, I shall feel as free to throw it overboard, or at least to doubt it, as if it disappointed my demand for uniformity of sequence."

James insists on the validity of the subjective testimony, as against retrospective wisdom or objective observation.

"... decisions, for him who makes them, are altogether peculiar psychic facts. Self-luminous and self-justifying at the living moment at which they occur, they appeal to no outside moment to put its stamp upon them or make them continuous with the rest of nature. Themselves it is rather who seem to make nature continuous; and in their strange and intense function of granting consent to one possibility and withholding it from another, to transform an equivocal and double future into an inalterable and simple past."

Bergson, like James, finds in subjective experience the warrant for his beliefs, but his solution is at once more radical and more critical. The scientific account of things is not merely too partial; it is impotent to grasp reality. Not only science, but logic is without power to lay hold of the reality of things-becoming; their kingdom is the dead, static past. With rare critical insight he singles out the reason for this limitation. Logic is *spatial thinking*; it is concerned with separations, overlappings, inclusions; with the relations of parts and wholes, all of which can be symbolized and represented as relations of exten-

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sion. On the living tissue of experience, on motion, on transition it can lay no hold; for these things-becoming it ever substitutes the dead shell of the thing-become. Time, as time passing, is the creative process itself. Only when the trickling moment is congealed in the stillness of the past can it be scrutinized, dissected, compared. Time, to be thought about logically, must become space,—that is, past time.

All of which is all very well for those who can find solace for their *Weltschmerz* in a rejection, partial or complete, of the scientific presupposition. The stumbling block in the way of their acceptance is the success of science. Both James and Bergson rest their argument on the supposed limitations of the scientific approach to reality. Their reasoning, if accepted, leaves us free to believe in indeterminism, but that is all. They produce no new magic formula capable of victories of its own to match the conquering onrush of science. Both writers admit, in effect, that science as such rests on determinism. To the practical, pragmatic mind they thus concede everything. Abstract reasoning can make little headway against the logic of success, the argument of "method and results." If determinism is a necessity of thought for the physicist, it is bound to invade biology and psychology, however valiantly the rearguard of the vitalists and introspectionists may dispute the advance. For the success of determinism as a working hypothesis is undoubted. The whole history of biology is a chronicle of its victories and of the shifts of the vitalists in their endeavors to find some corner not accessible to the chemist and physicist, some phenomena distinctively vital. The behaviorists have started a similar assault in psychology, denying the existence of the distinctively psychic and asserting that the objective traits of human behavior—that is, the material reactions of

the organism—are alone knowable and that their description exhausts reality.

With determinism as a working hypothesis there can be no quarrel. The physicist may be interested only in those aspects of nature which fall within its scope; the biologist may limit his study to phenomena expressible in the mechanistic formula; the behaviorist may assert "consciousness" to be none of his business. But, unless some rival hypothesis can be shown to be equally effective, it is against all reason to imagine that it will retain this provisional character. The meaning of the word will shift from epistemology to ontology, hypothesis will become dogma, and the meaning of the universe will pass from a pragmatic "as if" to a categorical "nothing but." We cannot meet this advance by pointing to the lack of proof. It is idle to talk of limits to scientific inquiry, for science has again and again broken through such barriers and there can be no assurance that the new ones will hold. Nor will a mere license to doubt determinism avail much, if all that is positive and triumphant in human thought is bound up with belief.

But what if there should be an alternative hypothesis, powerful in its own right to order experience and interpret nature? What if the concept of indeterminism, void of positive content as it might at first seem, could be shown to be able to dominate autonomously a realm of its own and even perhaps to invade the kingdom of its enemy? In that case the situation is completely changed. Determinism can never progress beyond the stage of an hypothesis,—entitled, indeed, to a full acknowledgment of its pragmatic value but to no pretensions of dogmatic sanctity. But can this be done?

It has been done already. A large and growing body of modern physical theory rests, in effect, on a postulate

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of indeterminism in events. Only an ignorance of science and a slavish worship of dialectic has prevented the recognition of this fact by philosophers. Science is, in fact, one thing; and the philosophy of science quite another. Science stands to philosophy in the relation which literature bears to criticism, art to aesthetics;—the one active, self-justifying, unconscious; the other withdrawn, hesitant, introspective. Just as the living tissue of creative writing has a way of breaking through all set forms, disregarding all canons of criticism and making a new tradition, the growing body of science has found little nourishment in the "methods" it has been supposed to follow. Since the time when Bacon erected the preposterous fabric of his *Organon* to the present, the creative element in science has eluded the grasp of criticism. It was Bacon's contemporary, Harvey, I believe, who said that Bacon's ideas of science were "such as might be expected of a Lord Chancellor." John Stuart Mill's *Canons of Induction* have waited till quite recently for a similar devastating criticism by Norman Campbell:

"If the discovery of laws could be reduced to a set of formal rules, anyone who learnt the rules could discover laws. But there is no broad road to progress. Herein lies the most serious objection to much that has been written on the methods of science. There is no method, and it is because there is no method which can be expounded to all the world that science is a delight to those who possess the instincts which make methods unnecessary."

This is not to deny to philosophy an important function; it is to emphasize its true function. This consists not in teaching the fish to swim and the bird to fly, not in laying down rules for the scientist to follow under penalties of excommunication; but in extracting from a certain phase of creative activity its universal significance. Not the meaning of science for the scientist, but its meaning

for art, for religion, for life itself is the philosopher's concern. In furtherance of this object it is incumbent on the philosopher to see science as it is, not to force it into an arbitrary mould. It is precisely here, I think, that he has failed. The philosopher has chosen to see in mechanics the perfect type of science, of which all other modes were but incomplete realizations. By so doing he has been able to erect neat, self-contained systems; the stuffed animal has proved much more manageable than a live one. With apparently complete self-satisfaction he has ruled out as "unscientific" or as "illogical" anything that would not fit the scheme. Thus, while the philosopher has gone one way, the scientist has gone another, refusing to accept responsibility for dialectic tangles, content with his pragmatism and meeting Eleatic dilemmas with a "*solvitur ambulando*."

The body of physical theory to which I refer and which I claim involves the abandonment of the deterministic postulate is the theory of so-called "irreversible" phenomena. The laws of these rest, according to our present view, on a *statistical* basis; their formulation and interpretation is in terms of the theory of probability, and this in turn is irreconcilable with determinism. In the following argument I shall avoid as far as possible the technicalities of physics, limiting my illustrations to matters of every-day knowledge. Though the exposition is at best a difficult matter, I have some hope of setting its main features in a clear light, leaving for later treatment some of the implications of the main thesis.

The philosophical essence of the science of mechanics is to be found in the concept of time which it uses. The planet swings round the sun; yesterday it was there, today it is here, tomorrow it will be yonder; but this yesterday, today and tomorrow are but illusions imposed by the finite-

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ness of our senses. Where the planet was and where it will be are both accessible to the mind. That which has happened still is, and that which will happen must be and thus in a sense exists already. Effective causation is an illusion; the present is no more determined by the past than by the future; the past, the present and the future are bound together in a single coherent whole which, to the eternal mind, simply *is*.

For it is characteristic of the laws of mechanics that the recovery of the past and the prediction of the future are on exactly the same footing. If nothing but the direction of motion were changed, the future history of this new mechanical universe would recapitulate the past history of the old. The phenomena are, as we say, *reversible*. Past and future have for mechanics no more absolute significance than right and left, forward and back. So long as we deal with these reversible coherences we may apply the ideas of Einstein, convert time into another dimension of space and plot every event in a four-dimensional eternity. It is to Bergson that we owe the clear perception of this spatial character of mechanical time. He was, however, imperfectly familiar with the science of his day and hence assumed spatial time to be "the" time of all scientific thinking. The result has been a quite unnecessary opposition of his views to scientific modes of thought, an opposition which leaves him, like Berkeley, with the problem of accounting for the possibility of objective knowledge. It will be seen in what follows that actual scientific thought is in much closer accord with Bergsonian ideas than he imagined.

For even if we ignore the testimony to which Bergson makes appeal, namely, the facts of our subjective life and those of organic nature, we cannot thus reduce the empirically given universe to a timeless geometric manifold.

Whatever the ideal world of dynamics may be like, the actual inanimate world is one in which *things happen*, in which past and future are absolute, not relative categories. Thunder follows lightning. If we place a kettle of water on the stove, the water gets hotter, not colder. Quite apart from the forms of life, the earth itself has changed in a way not comparable to its motion in its orbit; the change is not part of a cycle. Certain processes of nature are, as we say, *irreversible*. I use the word as the physicist uses it, without metaphysical commitment or connotation, simply to describe the empirically given fact. It may be that the world is so constructed that even here the distinction between past and future is one to which nothing in rational thought corresponds, that there is no reason *a priori* why an observer should find the course of events going in one direction rather than another. The earth moves in an orbit which, seen from the north, is described counterclockwise, but no one imagines that this direction is to be preferred over the reverse as having profounder roots in the very order of being. If we leave out of the argument, as I do here, the fact that the universe is experienced or thought about by human minds, it might be claimed that the "time" in all physical processes could and possibly does "run backward" somewhere else. Those who hold to the mechanical concepts are bound, it seems to me, to admit the possibility of such a universe as conceivable on equal terms with the one we know, but I shall not press the point. The physicist at least has accepted the fact of such irreversible processes as a part of his experience, and has sought not only to formulate empirical laws but to obtain some insight into their nature.

This insight was furnished by Clerk Maxwell through his work on the kinetic theory of gases. The atomic theory, of ancient origin, had been applied by Dalton to

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explain the facts of chemistry, but until Maxwell's time it had little importance as a physical hypothesis. With the kinetic theory of gases was inaugurated a new method of physical inquiry,—the statistical method. Since then its scope has been vastly extended, but it has not received from philosophers the attention that it deserves. It cuts more deeply into our ideas about nature than is generally recognized and, as I hope to show, leads to a cosmology radically different from that based on Newtonian ideas.

To make this clearer it will be well to have one or two illustrations of irreversible processes so that the argument can be pointed with concrete examples. Suppose I put into a glass some red ink and some blue ink. If I pour carefully I can have one color at the bottom of the glass and another at the top with a fairly sharp line of separation. This condition will not be permanent. Left to themselves, the colors will gradually mix by diffusion. Anything that we can do in the way of stirring or agitation will only hasten this process of mixing; we cannot alter the direction of the process. A second simple illustration is that of a hot body A and a cold body B placed in contact. What happens we describe as a flow of heat from A to B which continues until both bodies are at the same temperature.

The description of these two processes in terms of the atomic theory is on its face very simple. We consider the molecules, either of the liquids or of the hot and cold bodies, as colliding at random, and thus foresee the final result as the statistical outcome of an enormous number of individual collisions. We say that the mixed state of the inks, or the equal temperature of the two bodies, is "more probable" than the unmixed state or the unequal temperatures,—so much more probable that its eventual

attainment is a matter of practical certainty. The processes are seen as exactly like those involved in shuffling a pack of cards. If we take a new pack fresh from the maker, the cards are arranged in a certain "regular" order. As we shuffle, this order is replaced by other arrangements which we call "irregular." We say that the irregular arrangement is more probable than the regular, but this does not mean that any one arrangement is more probable than any other. It is the *kind* of arrangement that is more probable. Of all the possible ways that we may arrange a pack (the number of which, though large, is finite) a very small proportion are singled out as regular, while the overwhelming majority are lumped together as irregular. The greater probability of the irregular is for the same reason that white sheep eat more than black—there are more of them. In the same way, of all the equally probable distributions of the ink molecules in the glass, all but a very small fraction constitute what we call mixtures; of all the equally probable interchanges of energy between the fast-moving molecules of the hot body and the slower-moving molecules of the cold body, an overwhelming proportion involves a loss of energy by the fast molecules and a gain by the slow molecules. All our calculations of probability are made in this way. We analyse the possibilities into equally probable instances, and find the probability of some one characteristic or quality of the event by calculating what proportion of all these possibilities possesses the assigned character. If we grant an understanding of the meaning of equal probability, the rest of the physicist's argument presents no special logical difficulties. But what do we mean when we say that two events are equally probable? What, indeed, do we mean when we talk of probability at all?

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nothing except as a name to cloak our ignorance. The die or the coin falls in the manner preordained for it; where necessity reigns there can be no talk of real possibilities in the future, or of real probabilities. To speak thus is to say that the future holds genuine alternatives; it is to negate the principle of causation. There is no need to recapitulate at length all the old arguments. For this contention is really an admission of what I should have been at some pains to prove; namely, that the idea of probability is inconsistent with the idea of necessity. We may even go further and admit that the deterministic standpoint is the only one consistent with the processes of formal logic; that the concept of probability eludes all attempts to formulate it logically and leads us into a maze of paradox. For instance, suppose we say that in the fall of a coin heads and tails are equally probable. When challenged to define our terms we make a poor showing. We may say that in a large number of throws the percentages of heads and tails will be equal, or we may appeal to the accumulated results of past trials. But neither of these statements covers the content of the original assertion. For our prediction of the future cannot be absolute but must itself be stated as a probability, while our inference from the past is likewise only probable. We are thus forced to define one probability in terms of another and our logic comes full-circle upon itself. No logical way out of the difficulty has been found or seems likely to be found. Whoever wishes a fuller presentation of the difficulty should read the chapter on probability in Poincaré's *Science and Hypothesis*.

But though determinism and logic agree as to the proper way to deal with the question, this way is altogether too summary. Decapitation is indeed a sovereign remedy for most diseases, but it has always been unpopular. In

spite of logic, the assertion that heads and tails are equally probable is much more than a confession of ignorance,—its significance is positive. And though we may deduce from the assertion other affirmations about the statistics of repeated trials, the primary meaning relates to one event; we affirm this event to possess a certain quality or characteristic. We know practically the meaning which we cannot express. The assertion of probability determines a certain practical attitude toward the future. Devoid of logical foundation as the theory of probability undoubtedly is, it is able to meet this pragmatic test of rationality; it helps us to organize our experience and heightens our sense of understanding of the empirical data. I know that to many pragmatism is epistemological anarchy; and many more will be appalled at the thought of dispensing with logic. But the situation is none of my making. I am describing the way in which a good deal of scientific thinking is carried on today and, logical or not, this thinking seems to those concerned with the increase of positive knowledge to be important.

But though we cannot resolve the paradox, I think that Bergson has given us more than a hint as to the real nature of the difficulty. May not this lie in the fact that all logical thought is *spatial*, that its scope is limited to those relationships, such as the whole-and-part relation, which can be symbolized by extension? For space, with its added dimension of time past, is the universe of things-become. Probability is our mode of laying hold on the not-yet-become, on time as opposed to space. It is not so much illogical as non-logical. It opens to the mind a domain to which spatial thought cannot penetrate. I hope to show presently that it leads to conclusions of a different order from those attainable by canonical logic. But first I must make one point clear.

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This is that the very concept of probability denies determinism. "May" and "must" are irreconcilable. When I say that the chances are equal of the coin coming up heads or tails, I assume that the event is not yet a part of nature. The course of nature in the matter of penny-pitching behaves *as if* the result were not merely unknown, but unknowable; *as if* the result of each toss were unrelated to previous events. The assumption may be wrong but it is superfluous nonsense to say that indeterminism is inconceivable. That which is apparently true is certainly conceivable. Another illustration will help to show more clearly that the concept of probability involves the idea of unrelatedness. Suppose I calculate the probability of a given hand of cards. From the result of this calculation I make a prediction about the statistics of such hands. This prediction is an affirmation as to the course of certain natural events, and can hence be tested by experiment. But to make this test valid, it is necessary to shuffle the pack thoroughly between each deal, thus deliberately breaking the links which bind one hand to the next. It is no answer to this for the determinist to say that the links cannot really be broken; that if we knew all the steps the outcome of each deal would be a matter of certain foreknowledge. For the question here is not what we might know, but *why we shuffle*, and to this question the determinist can give no answer. If the whole question is one of ignorance or knowledge, why do we endeavor by shuffling to increase our ignorance?

But not only does the concept of probability deny determinism; it leads to a prediction which is not accessible to the determinist. Return to the simpler example of the coin. Let us allow the determinist his knowledge of causes. Thus armed, he calculates for us the result of a hundred throws. He predicts for us a certain succession

of heads and tails and the relative percentages of these are necessarily included in his forecast. But they will be the percentages for that particular problem; the statistical prediction as such will elude his mathematics. He will only be able to assert that it "just happened" that way, because his causal data "just happened" to be that kind of data. While his figures may tell him that there will be, say, forty-five heads and fifty-five tails, this fact has for his point of view no significance. The indeterminist, on the other hand, goes straight to the statistical prediction with the aid of his assumption. Though he never reaches absolute certainty of the future, he speaks with more assurance of the result of a million throws than of a hundred. The more hopelessly insoluble the problem considered as one of causes, the more certain the prediction based on the assumption that there are no causes. If the concept of probability is merely a cloak for our ignorance of causes, in what strange manner does increase of ignorance bring certainty of knowledge?

Please bear in mind that I am not attempting a refutation of determinism. On the contrary, I believe that in the very nature of things this is impossible, for it would require us to show that things *could have* happened otherwise than as they did, and nothing in nature is really repeated. All that I have attempted is to deprive the doctrine of that philosophical sanctity which attaches to a supposed necessity of thought; to show that the doctrine of indeterminism plays an important part in actual scientific thought, and that it shares with determinism such pragmatic prestige as attaches to the success of science. But while a physicist could supply the scientific corollaries to my talk of cards and penny-pitching, the general reader will be left somewhat in the dark as to the scope and scien-

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At the present writing the science of physics is in a state of transition and therefore of comparative confusion, and any sweeping statement as to what doctrines are generally accepted could quite properly be challenged. Avoiding these difficult questions of dogma, we are on safer ground if we indicate merely those tendencies of modern speculation which have demonstrated their usefulness; and chief among these is the so-called quantum theory. The definite article is misleading; there is not one quantum theory but many. But the common element of all these is the belief—first forced on the physicist by stubborn facts and later triumphantly applied in the conquest of new knowledge—that the processes of inanimate nature are fundamentally discontinuous, and that even the apparently continuous and determinate sequences of mechanical phenomena are but a composite statistical picture, made up of individual events which are governed by relations of probability.

Thus the apparent determinism which our laws postulate becomes only a practical determinism of a statistical result, based on a "fine-grained" indeterminism in the constituent atomic phenomena. Not that the physicist has formulated any such doctrine. Most of them would be shocked at finding that they have lent any support to such damnable heresy, denying as it does the invariability of the causal relation. But I at least can see no escape from this conclusion as the practical upshot of their train of thought. For it will be noted that the temporal relation of cause to effect is, from the statistical point of view, incompatible with the determinist postulate of invariability. Only on the assumption that something else may happen

can we assert what probably will happen. The development of modern physics makes at least conceivable the hypothesis that all the order to be found in nature is a statistical order, into the constituents of which there enters an element of indeterminism. Determinism has been dispensed with as a necessity of rational thought in so far as the thinking of men like Bohr and Einstein can be called rational. To see this clearly is our first need if we would bring our philosophy into line with our activity, and if I have made a beginning toward proving this one point, it is as much as I have a right to hope for. But much more remains to be done. The implications of this new cosmology in biology and psychology cut pretty deeply into current conceptions, for it is in the realm of probability that the living shows the widest divergence from the non-living. And it is above all here that there is need of a philosophy which does not deny its own significance,—to which possibilities are something more than illusion, and creative effort a reality.

C. M. SPARROW.

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CAUSALITY AS AN ONTOLOGICAL RELATION

I

AN ontological relation, in the meaning of the present discussion, is a type of relation which contrasts with a logical relation. The contrast is this. A logical relation is a relation between logical elements, *e. g.* between concepts or propositions. An ontological relation is a relation between existential elements, *e. g.* between things or events. Thus a person says, "If X. . is a good flower garden, X. . will have roses." Presented in this statement among other items is a relation (a) between the propositions "X. . is a good flower garden" and "X will have roses," and (b) between the concept of good flower garden and the idea of roses. The concept of good flower garden is here presented as implying the idea of roses, and the proposition "X. . is a good flower garden" as implying the proposition "X. . will have roses." The relation presented in each case is a logical relation; it is the relation of implication. Consider, however, the statement, "My garden is next to that wood." Here also a relation is presented, the relation of next to, or contiguity. But this relation is not here a relation between propositions or concepts. The concept of my garden and the idea of that wood are not here presented as next to each other. Nor are any propositions. The relation here presented is rather between two particular existents, the garden and the wood. It is these two

particulars, perceptible, not conceptual, and occurrent in space and time, that are presented in the statement as next to each other. Such are ontological relations. They are such relations as contiguity, co-existence, succession, and the various other relations which hold, not between the universals of knowledge, but between the particulars of existence. The conviction behind this article is that causality, primarily and essentially, is also a relation of this type.

An influential belief in current philosophy is, however, that this certainly is not so. Causality, if it has any meaning at all, it is claimed, is a logical relation. It is a principle by which you can infer from certain propositions about events certain other propositions about events. Causality, on this view, is simply a special principle of inference. This position is taken, for instance, by McTaggart who holds that causality is a type of determination, "a determination of Implication. The cause implies the effect."¹ "Strictly speaking," he says, "implication is a relation between propositions, or truths, and not between events. But it is convenient to extend our use of it, so as to say that, if one proposition implies another, then the event asserted in the first implies the event asserted in the second."² Strictly speaking, however, as McTaggart says, causality is on this view a relation of implication between propositions about events. This general position, that causality is a type of logical determination between propositions about events, is adhered to also by Mr. Russell and Mr. Broad. Thus Mr. Broad: "The law of causality is perhaps the assertion that to every true proposition that asserts the happening of an event at a time there is a set of relevant true propositions such that relative to the whole

¹ The Meaning of Causality, *Mind*, N. S., Vol XXIV (1915), p. 326.

² *Ibid.*, p. 327.

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of them the probability of the event happening is 1."³ And again: "A cause in the most general sense is a set of successive sets of contemporary events from which other sets of events can be inferred."⁴ That is, a cause is a set of logical abstractions from which another set can be inferred.⁵ Mr. Russell, who finds it difficult to speak his thoughts on causality in non-mathematical language, proposes the following definition as probably the nearest approach to a correct non-mathematical definition of a causal law: "There is a constant relation between the state of the universe at any instant and the rate of change in the rate at which any part of the universe is changing at that instant, and this relation is many-one, *i.e.* such that the rate of change in the rate of change is determinate when the state of the universe is given."⁶ Cause and effect are here construed as a given state of the universe and a certain rate of change, and their relation (causality) is interpreted as a type of determination. This determination Mr. Russell warns us is a purely logical determination between wholly logical terms. "The law," he says, "makes no difference between past and future: the future 'determines' the past in exactly the same sense in which the past 'determines' the future. The word 'determine', here, has a purely logical significance: a certain number of variables 'determine' another variable if that other variable is a function of them."⁷

The chief aim of this article is to discuss causality as an ontological relation. But before doing this, I would like to indicate that the general contention of this Cambridge group, that causality is essentially a logical relation, the

³ *Perception, Physics, and Reality*, pp. 153-4.

⁴ *Ibid.*, p. 137.

⁵ *Cf. Scientific Thought*, p. 56.

⁶ "On the Notion of Cause," *Proc. Aris. Soc., N.S.*, Vol. XIII (1912-13), p. 14.

⁷ *Ibid.*, p. 15.

relation of logical determination, is defective, and, if taken as adequate and complete, is invalid and false. To this task I shall devote section two, below. In section three I shall state the nature of causality as an ontological relation and endeavor to show that the defects of the logical-determination view are thereby overcome.

II

That there is some principle logically connecting propositions about events is of course undeniable and important. But to call this principle causality is, as I think, a mistake, and for two reasons: (1) the terms of the causal relation, cause and effect, lose, on this view, their distinctive character, whereas in common thought and in truth they are distinguishable and have a distinctive character; and (2) the relation of causality itself, on this view, loses its distinctive character and becomes indistinguishable from various other relations.

(1) The first point is admitted by McTaggart. "Our definition of causality," he says, "gives us no criterion for distinguishing one term as cause and the other as effect." "The course that I think most convenient therefore is to speak of causal relations as existing between terms, but not to speak of one of these terms as cause, and of the other as effect."⁸ Mr. Broad believes that the distinction between cause and effect depends on the fact that many causal laws, as stated, are not reciprocal, so that in them as they stand one term determines the other, but not *vice versa*; the determining term is here the cause, the determined term the effect. "On the other hand," he says, "when the causal law becomes strictly reciprocal I doubt if it be possible any longer to give a reasonable meaning to the distinction between cause and effect."⁹ But if in a causal law cause and

⁸ *Perception, Physics, and Reality*, p. 127.

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effect are taken in exactly equal generality, and this I think is theoretically possible if not practically feasible in any case of causality, the causal law becomes reciprocal, or the cause and the effect stated in the law become logically interdeterminate.¹⁰ So here too there is theoretically no criterion for distinguishing cause and effect. Either term of the causal relation may, as you like, be called cause or effect. This first result of the logical-determination view of causality, may seem to some very unimportant. But I think it is quite important and for two reasons. In the first place, common sense (if I may here assume the toga) does make a distinction between cause and effect: thus it would say (to borrow an example from McTaggart) that drinking alcohol by A was the cause of the subsequent drunkenness in A, but it would never say that the subsequent drunkenness in A was the cause of the preceding drinking of alcohol. And in the second place, not only does common thought make this distinction between cause and effect, but it may admit as true that cause and effect *properly stated* do logically determine each other and still make the distinction. There is nothing in this admission, it may say, that cancels for it as it would for the logical-determination view, the distinction between cause and effect. Thus common thought may admit, as it is possible to claim, that the cause and the effect in the case under consideration may be stated in propositions that logically or in knowledge interdetermine each other. Or more exactly still, it may admit that a proposition asserting the ex-

¹⁰ For instance, in the causal sequence friction-heat, if the effect (heat) is taken in a generality equal to that of the cause (friction)—*e.g.* taken as the heat produced by friction where the cause is taken as the friction that produces heat—then the heat if given logically determines the type of cause as much as the cause if given logically determines the type of effect. Thereby this typical logically non-reciprocal sequence becomes logically reciprocal, and on the view that causality is logical determination, as accepted by Mr. Broad, either term of the relation here may be called cause or effect. For an adequate discussion of reciprocal and non-reciprocal causal relations, the reader may be referred (*e.g.*) to H. W. B. Joseph, *An Introduction to Logic*, Chap. XXII.

istence of the cause (there exists at t drinking by A of M amount of alcohol) not only implies but is implied by a proposition asserting the existence of the effect (there exists at t' drunkenness of N amount in A). Given either of these propositions, and our knowledge is such that you may infer or argue to the other proposition. These propositions asserting causal existence, it may grant, are now logically interdeterminate. Nevertheless, common thought may insist on its original distinction. While propositions about the drinking and the drunkenness may stand to each other in this way, the drinking and the drunkenness, which are not propositions, it may say, still stand to each other in their original way. The drinking is the cause of the drunkenness and the drunkenness is not the cause but the effect of the drinking. What the logical-determination view says about the relation of a proposition asserting the cause to a proposition asserting the effect (that the former determines the latter) may be equally true of the relation of a proposition asserting the effect to a proposition asserting the cause. But a cause itself remains a cause, and an effect itself remains an effect, and the original distinction between the two, as discerned in common thought, is unaffected by this new information which has to do not with the cause and the effect themselves but with propositions phrased about them. This then is the first defect of the logical-determination view of causality. On this view cause determines effect solely in the sense that a proposition about the cause implies a proposition about the effect. But in this sense of determination (and causality it must be remembered is a relation of determination) an effect may as equally determine a cause as a cause an effect, so that on the logical-determination view cause and effect become indistinguishable in character and function, and either term of the causal relation may, as you like, be called cause

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or effect. On the other hand, in common thought (and I think with truth) cause and effect are held to be originally distinct and to have an originally distinctive character, and this distinctiveness, which is based on a determination between the existents themselves and not between any propositions or other logical expressions about them, remains and cannot but remain in its original form untouched, when the logical-determination view, which concerns only propositions or other logical expressions, is allowed to say all it has to say about causal propositions.

(2) The second defect of the logical-determination view of causality is that on it the causal relation itself loses its distinctive character and becomes indistinguishable from various other relations. This is admitted by Mr. Russell who says, "Any case of sufficiently frequent sequence will be causal in our present sense; for example, we shall not refuse to say that night is the cause of day."¹¹ Thus causality and constant conjunction in sequence here fuse and are one. Again, Mr. Broad, who holds that "there seems to be no good ground for rejecting simultaneous causality in general,"¹² admits that "if we accept simultaneous causality at all there is no difference in principle between the connexion of cloven-footedness with chewing the cud and that between the momentary states of the fire and the water."¹³ That is, there is no difference in principle between a co-existence and a causal connexion. "In the example of cloven-footedness and ruminance," he indeed adds, "I think that we must admit that we have a very specialised case of a causal law."¹⁴ Thus co-existence as

¹¹ *Op. cit.*, p. 13.

¹² *Perception, Physics, and Reality*, p. 129.

¹³ *Ibid.*, p. 128. The causal relation fire-water referred to here is between a fire and the water it is boiling in a teakettle.

¹⁴ *Ibid.*, p. 130. This case is called very specialised because it is believed that it always appears only as a case of what Mr. Broad calls simultaneous immanent causality.

well as constant conjunction in sequence¹⁵ could be considered, from the logical-determination point of view, as types of causal connexions. And there would be other instances.¹⁶ Causality on the logical-determination view thus would blend with and becomes essentially indistinguishable from a whole set of relations commonly considered different from it. This outcome, as I think, is not welcome. And the reasons for this are not dissimilar from those set forth above in regard to the indistinction between cause and effect implied on the logical-determination theory. In the first place, common thought does make a distinction between a causal relation and a relation of the allied types — *e.g.* between causal connexion and co-existence. Thus it might grant that the distribution of light is the cause of the appearance to the normal eye of the green color of a living pine-cone, but it would never grant that the prickliness of the cone which is co-existent with the green, is the cause of the green. That, it would say, I think, is strictly a case of mere co-existence. But in the second place, not only does common thought make a distinction between causality and co-existence, but it may admit as true that, like a cause and an effect, a co-existent, if properly stated, may logically determine another co-existent. And still it may insist on its distinction. There is nothing in this admission, it may say, which cancels the distinction as

¹⁵ Mr. Broad would reject the conjunction of night and day as causal because it is analysable into other regularities. But if a constant conjunction in sequence were not so analysable, it appears, he would identify it as a causal connexion. *Op. cit.*, p. 130.

¹⁶ The reason why causality on the logical-determination view has the latitude we have noted is indeed that wherever you have factors in relation which are such that from propositions about the existence of the one you can infer the existence of the other, you have, on this view, a causal relation. This naturally leads to all sorts of cases of determination becoming causal. Thus, if in a continuous stream of events, two are given as separated for observation by an interval, it is determined logically that there is either an event or a set of events between the two given events. On the logical-determination view, the relation of the two given separate events and of the stream of events to the event or set of events of the interval, is the relation of cause to effect.

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it sees it between causality and co-existence. Thus common thought may grant not only that a proposition about the existence of a cause (there is a certain distribution of light in the presence of that normal eye viewing that living pine-cone) implies or logically determines a proposition about the existence of an effect (there exists an appearance of green to that eye); but also that a proposition about the existence of one co-existent (this is the prickliness of a living pine-cone) implies or logically determines a proposition about the existence of a second co-existent (there is green here for a normal percipient under certain lighting conditions). Given the first proposition in either case, and our knowledge is such that you can infer or argue to the second proposition. The first determines the second. Nevertheless, common thought may insist that while propositions about the light and the green, and propositions about the prickliness and the green, may, in each case, stand to each other in this way and in the same way, the light and the green, and the prickliness and the green, which themselves are not propositions, still stand to each other in their original way, and these are different. The light and the appearance of green stand to each other as cause and effect and comprise a causal connexion; the prickliness and the green themselves stand to each other as associate co-existents and comprise together a co-existence. What the logical-determination view says of the relation between propositions about the existence of cause and effect may also be true of the relation of propositions about the existence of two co-existents. But a cause itself remains a cause, a co-existent remains a co-existent, and the original distinction between the two (and thus between the relations into which they enter), as discerned by common thought, is unaffected by this new information which has to do not with the cause and the co-existent themselves

but with propositions phrased about them. This then is the second defect in the logical-determination view of causality. On this view the causal relation itself loses its distinctive character and instances of constant conjunction in sequence, of co-existence and of other relations, being comprised of terms between which a logical determination may hold, may be called, if you like, causal connexions; whereas in common thought and as I think in fact causality and these allied relations are distinct, and this distinctiveness, which is based on the nature of the relation of the "terms" themselves and not on the nature of the relation of propositions or other logical expressions about the "terms," remains and cannot but remain untouched, when the logical-determination view, which concerns only propositions or other logical expressions and their relations, has been allowed to say all it has to say in regard to causal and allied propositions.

It would thus appear that the logical-determination view omits a good deal that is essential and distinctive in causality, and is therefore inadequate and false unless indeed the distinctions between cause and effect, and between causality and allied relations, which are clearly preserved in common thought and appear to be actual and real in fact, are themselves in the end ungrounded and false. I think that the distinctions made by common thought are real distinctions and can be shown to have ground and validity by stating and establishing an account of causality as an ontological relation. If this is so, and I shall try to show in the next section that it is, it would then certainly follow that the logical-determination view is as such untrue and invalid. This logical-determination account of causality, to be sure, is true and valid in the sense that a true account of causality will include a notice of the fact which we have already noted, that propositions about cause

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and effect are logically determinate, even as a true account of causality will include some notice of the facts pointed out by Hume, that cause and effect are spatio-temporally "contiguous" or continuous.¹⁷ But the logical-determination account of causality is untrue and invalid, as is Hume's, if it is claimed, and this is the claim, that it contains the whole and essential meaning of causality.

III

I propose now to state as best I can the meaning of causality as an ontological relation. I do not of course hope, or propose to try, to solve the whole nest of problems that surround causation. I shall merely define the meaning of causality as ontological, and then, by commenting on the various parts of this definition, try to expand its meaning adequately, and defend the view which it supports against the more fundamental objections that would be made against it. In doing this we shall find, I think, that this account of causality is compatible with the truth that is in the logical determination view and is also, as valid, sufficient evidence for the validity of the distinctions between cause and effect and between causality and its allied relations preserved in common thought.

Causality as ontological, we may say, first of all, is a two-termed relation between changes or states, one or several of which are called the cause and one or several of which are called the effect. I will assume that there is such a reality as a relation, and moreover that it is understood what a relation is. These assumptions, I think, will be allowed. In order then to explain the above statement I will define the meaning of the first term of the causal relation, the cause. This, as will be seen, will clarify sufficiently the meaning of the other term of the relation, the

¹⁷ And perhaps also of the fact that the mind leaps forcefully and as if by necessity from the idea of a cause to its effect, thanks to psychological habit.

effect, and make a separate discussion of it superfluous.

A cause we will define as a change or a state which is existentially continuous with another change or state and which brings about, under the circumstances, the occurrence of the other change or state—the other change or state being called the effect. This definition has three main parts: (1) a cause is a change or a state, (2) this change or state is existentially continuous with another change or state, and (3) this change or state brings about, under the circumstances, the occurrence of the other change or state. I will now comment in turn on each of these main parts of the definition of cause, trying at once to expand their meaning and to remove the fundamental difficulties that may be felt to beset them.

(1) "A cause is a change or a state." This part of our definition presents few difficulties. Still there are several points worth noting about it. First, some have denied that there is such a reality as change. Change, they hold, is contradictory and since the real is at least non-contradictory, there can be no such reality as change. It is of course impossible here to state and examine the arguments on which this position rests although I hope to do this in another article.^{17a}

Fortunately however it is not necessary for the present argument to take this trouble. The position in question, while holding that change is unreal, does not deny that there is something that appears to be change, and moreover it does not at all deny states. This is sufficient. Cause in our definition then becomes, even allowing the arguments for the unreality of change to be valid, either an apparent change or a state, both of which have reality. The essential meaning of our definition of cause is thus

^{17a} This article, entitled "The Nature of Change," will appear in the next issue of *The Monist*.

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not altered by the position denying reality to change. A second point in regard to this part of our definition concerns the fact that it states that a cause is *a* change or *a* state, the implication being that a cause is *one* change or *one* state. This is in certain cases of course true, but equally in certain other cases it is not at all true. Thus we do say that the overflowing of the ink from this pen onto this paper (one change) is the cause of the blot here on this paper (one state). But equally we say that the noises of the street (many changes) and the heat (one state) are the cause of my headache (one state), and such. This point is not very important. Our definition of cause is stated in terms of *a* change and *a* state because this is the simplest form of stating the nature of a cause. But it is clear, as I think, that the alternative to a change and a state, namely, "more than one change or state," can be inserted without compromise into the definition as it now stands. A final point in regard to this part of our definition is that the cause is here described as a *change* or a *state*, but no mention is made of *persons* or *things*. The implication is that a cause is never a person or a thing. I think this is true. Neither a person nor a thing is a term in the causal relation itself. The terms of the causal relation are always either changes, or states of persons or things.¹⁸ Such a view as this, it should be noted, eliminates as irrelevant to the causal concept the ancient and rather befogged notion of agent and patient—of the thing or person that is active or acts (agent, cause) and of the thing or person that is passive or suffers (patient, effect). I am inclined to think that no general objections or deep regrets will be expressed over this elimination.

¹⁸ More generally, it is true, the terms of the causal relation are always events—namely, in the sense that a change or a state must occur or be an occurrent to be a causal term. But in this sense of event someone may believe that a thing or a person is an event, in that each to be actual must occur or be an occurrent. For this reason we have spoken of the causal terms as merely changes or states, and not as events.

(2) "This change or state (the cause) is existentially continuous with another change or state (the effect)." This part of our definition introduces one of the major problems of causality—the problem of continuity, and more particularly, the problem of time and of the temporal continuity of cause and effect. This problem, stated in a very comprehensive form so as to include not merely the problem of continuity but also the problem of time in its connection with causality, may be expressed in the form of a rather complicated dilemma. It is this. Cause and effect must be either temporally simultaneous or temporally successive. But no matter which you hold they are, you have hopeless difficulties—unless perhaps you are willing to surrender yourself completely to some form of the logical-determination view of the causal relationship. For suppose cause and effect are simultaneous, then temporal passage becomes irrelevant to causality and the causal relation becomes one of timeless determination—i.e. logical determination.¹⁹ If however cause and effect are said to be successive, then, as successive, they must be held to be either sequentially continuous or discontinuous. But they cannot be either. For suppose cause and effect to be discontinuous, then there is a blank time between cause and effect during which the cause does not operate. And if the cause does not operate for a finite time, however short, why should it ever do so?²⁰ Moreover, on this view, you are committed to the position that something is brought into existence (the effect) by something that has ceased and gone out of existence (the cause)—surely an unwelcome view.²¹ Cause and effect cannot therefore be discontinuous. But suppose they are continuous, the result is no better. For then, if

¹⁹ Cf. Lotze, *Metaphysic*, Vol. 2, Sec. 207, referred to by Mr. Broad, *Perception, Physics, and Reality*, p. 122.

²⁰ Cf. Bradley, *Appearance and Reality*, pp. 60-61. (Eighth Impression).

²¹ Cf. Bosanquet, *Logic*, Vol. 1, Chap. VI.

you take an infinitely thin slice across the continuous stream of events, this slice will contain the cause of all that follows; and yet, since it will occupy no time at all, it will not be an existent.^{21a} Or, since this slice can itself be divided into an earlier and a later part, and this division never cease, the true cause of what will follow can never be really found.²² The result of this complicated dilemma, where positive, is, as I have suggested, that causality must be conceived, if at all, only as a timeless, logical relation of some sort—and that real time as a causal feature must be wiped off the books.

Let us, however, look more closely at this dilemma, which consists, it will be noted, of a major division and a subdilemma under the second part of the major division. And first the major division, which states that cause and effect must be temporally either simultaneous or successive. This does not seem to be true. In most cases of causality if not in all, cause and effect are both simultaneous and successive. Thus the water in the teakettle over the fire first boils at a moment when the heat of the fire is still being applied to it (simultaneous causality) and as the heat continues the boiling continues (simultaneous causality), but also the boiling of the water comes about usually only after the fire has been under the teakettle for some time (successive causality). Thus the major division of the dilemma does not present a real disjunction. This point however is probably of little importance. The important point is: is the conclusion said to follow from accepting either part of this major division (as is clear we accept in the main both parts)—namely that the only intelligible meaning of causality, if any, is causality as some sort of logical principle—one which nevertheless we must admit?

^{21a} Cf. Bradley, *loc. cit.*

²² Cf. Russell, *op. cit.*, p. 5.

And first does the fact that cause and effect are simultaneous, supposing it to be universal, mean that the only connexion between cause and effect is some sort of timeless, logical one? I do not think it does. For in the first place a logical connexion, as we observed at the outset of this paper, is strictly a connexion between concepts or propositions. But neither the boiling of the water in the teakettle over the fire, nor the fire, nor the heat of the fire, to illustrate from the above case, is a concept or a proposition. And this is generally true of the changes and states involved in causality, they are ontological, not logical, realities. But secondly the fact that changes or states occupy the same time (are simultaneous) does not in any case imply either that the changes or states are timeless or that their relation is timeless. In occupying the same time, the changes or states occupy at least a moment, the same moment, which is a finite time, and the same is true of their relation, which is also occurrent then. Temporality is thus an actual as well as a relevant feature of the terms and the relation. And finally the fact that causal changes or states occupy the same time does not make these changes or states, as one conclusion has it, logically related as expressions of the Law of Identity. States or changes are identical if they are the same in all their characteristics—not in one. Two stamps are not the same because they are sticky, nor are two eggs the same because they are both egg-shaped, and likewise in regard to states or changes. The fire under the teakettle is not the boiling of the water in the teakettle because they both have the same date. We are therefore forced to hold that the conclusion said to be forced by the acceptance of the first part of the major division of the dilemma—namely, that simultaneity of cause and effect means that all connexion between cause and effect becomes logical and atemporal and that cause

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and effect themselves become timeless existents expressing, as some would have it, the logical Law of Identity—is utterly without warrant or foundation.

As to the second part of the major division of the dilemma, namely, that cause and effect are temporally successive, we may ask: does the fact that cause and effect are successive (as we have stated we believe that in most if not in all cases they are successive) imply, as the dilemma has it, a new and hopeless subdilemma as to the temporal continuity and discontinuity of cause and effect? In the second part of our definition of cause, which is now under consideration, we have said that cause and effect are existentially (that would at least mean, temporally) continuous. We are therefore committed to a rejection of the view that cause and effect are temporally discontinuous. The reasons for this rejection are many but the two stated in the above account (Bradley's and Bosanquet's) seem sufficient to warrant it. Cause and effect, in any case, we feel forced to hold are temporally continuous. Does not this, however, lead into the difficulties to which Bradley and Russell point? Does not this force us to hold that the cause is really a non-existent (Bradley) or at least that it must be impossible ever to arrive at the real, determinate cause of an effect (Russell)? I think that neither of these results follows from holding that cause and effect are, in our sense, temporally continuous.

By the temporal continuity of cause and effect we mean merely that between the occurrence of the total cause and the occurrence of the effect there is no temporal rift or break. The cause does not occur and cease, and then, after a lapse, the effect take place. The effect always takes place, whether the causality is simultaneous or successive or both, at such a time that between its occurrence and the occurrence of the total cause there is no temporal lapse or fis-

sure or break.²³ To some this may seem an odd idea of continuity. Indeed, the two objections stated above (Bradley's and Russell's) are based on deductions from a very different idea of continuity. This is the mathematical idea of continuity, according to which between any two members of a continuous series, such as cause and effect are taken to form, a third member can always be detected or inserted. The invalidity of these two objections, however, is due in part, to the very fact that they are based wholly on this mathematical idea. At all events, causal continuity in regard to time, as we conceive it, refers to an idea which *prima facie* is the very opposite, namely, that between the occurrence of the cause and the occurrence of the effect there never can be detected or inserted in that sequence a third change or state.

Let us briefly consider Mr. Bradley's and Mr. Russell's objections to causality conceived as a relation between continuous events. Both of these objections proceed fundamentally from the assumption that the continuous stream of events comprising a cause and an effect can be sliced into infinitely little slices or events, so that you may always reach, in searching for a cause, either an infinite subdivision which is a non-existent (Bradley) or no definitive or determinate sub-division at all (Russell). Now if this

²³ It might be objected that on this position wherein cause and effect are temporally unseparate, we are left without any but arbitrary and subjective means for distinguishing between cause and effect. Cf. e.g. A. E. Taylor, *Elements of Metaphysics*, p. 175. (Eighth Edition). This, as I think, is a mistake, parallel to the mistake of holding that cause and effect are identical because or when they occupy the same time. We shall see, in the third part of our definition of cause, that we have a definite "objective" basis for distinguishing cause and effect. But an example may at once show that there is no practical or theoretical difficulty in the way of discovering such a basis where cause and effect are nevertheless continuous in our sense. Thus in the case of the sequence heat-boiling, the boiling of the water (effect) always takes place at such a time that between its occurrence and the occurrence of the total cause, there is no temporal rift or break. Yet we can and always do distinguish the heat of the fire, which is the cause, and the boiling of the water, which is the effect. And this distinction is based, not on subjective or arbitrary grounds, but on what the heat and the boiling themselves are and on how they stand one to the other in this sequence. See (3) below.

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assumption about the slicing of actual events is put forward as a fact, it is, as I think, certainly false. No one has the ability actually to slice up any sequence of causal events either into infinitely little events or into anything at all. And there are in ontologic fact no infinitely little events—they are conceptual fictions. If however this assumption is put forward as a deduction from the mathematical theory of continuity, and this, as I think, is in both cases its character, then we may say, (a) that so far as the continuity of cause and effect as states or changes is concerned, this is accurately and wholly expressed in the definition of continuity we have used so that in this regard the mathematical idea of continuity is superfluous, but we may also observe (b) that the mathematical idea of continuity anyway applies accurately only to conceptual entities, such as numbers, Euclidean points, and abstract 'events,' but is useless and indeed false if directly applied to actual events or changes or states or any ontological elements, which are not concepts. Thus the mathematical theory of continuity would assert that between any two members of an event-series a third member of that series, indeed an infinite number of members of that series, can always be found or inserted, whereas between any two ontological events that are temporally unseparate, such as the heat of the fire at the time when the boiling of the water in the teakettle has begun, this is just what in that event-series actually cannot be done. The mathematical idea of continuity thus is not only superfluous but worthless for expressing the ontological continuity of cause and effect. From this we may see that the two objections under consideration here, resting as they do upon deductions from the mathematical idea of continuity, are at once ineffective and irrelevant as objections to the temporal

continuity of cause and effect conceived in the sense in which we use that term.

I will conclude this comment on the second part of our definition of cause with a few words on the spatial continuity of cause and effect. This continuity, it will be remembered, together with temporal 'contiguity,' was insisted on by Hume as a clear objective feature or as a phase of the existential continuity of cause and effect. It seems true. The fire, to be sure, is spatially separated from the water in the teakettle, at least by the bottom of the kettle. Still, accurately speaking, the fire is not the cause of the boiling of the water in the kettle, the heat of the fire is the cause. And this in part enters into the kettle and thus is not spatially separated from the boiling which itself transpires there. Again, the ice in the ice-box is usually spatially separate from the food which, due to it, is cold, but here too the cause has been misstated. The cause is not the ice but the passage of air cooled by the ice to the food in the food-chambers, and this is spatially continuous with the coolness of the food which occurs to the food there. There seems then no reason for denying spatial continuity to cause and effect if we mean by this continuity merely that between cause and effect, at some place, there is no spatial rift or break and if we rule out irrelevant mathematical ideas of spatial continuity which accurately apply, not to ontological, but to conceptual space. We should not of course be too positive on this point. We believe that a sound from a distant object is caused by vibrations coming from that object and impinging on our ear-drums and starting vibrations there which in consciousness are the sound. And we believe that the movements of the planets are caused by the gravitational attraction between their masses which we picture as expressed in events in the ether between the planets. But there is as

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yet no first-hand evidence, at least in the case of the planets, to prove this spatial continuity. The events in the ether at least seem on a par with the infinitely little events that are called for on the mathematical theory of continuity. There is however this difference that if there were in fact none of the infinitely little events called for on the mathematical theory of continuity, causality as ontological would still remain in full force, whereas, if there were actual proof that there were no intervenient events between the planets, we would undoubtedly say that there was no attraction between their masses and hence no causal connexion between the attraction of the planetary masses and their movements.

(3) "This change or state (the cause) also brings about, under the circumstances, the occurrence of the other change or state (the effect)." This third and final part of our definition of cause is the differentiating segment of the definition. By this the cause is described so that it may be distinguished from the effect—the cause is always the change or state which under the circumstances brings about another change or state, and the other change or state thereby brought about is always as such the effect. Here, we may also note, causality itself is assigned the character whereby it is to be distinguished from ontological relations such as constant conjunction in sequence and co-existence. These relations are not relations between terms which, as related by them, are marked by the characters of 'bringing about' and of 'being brought about.' Day, for instance, does not bring about night, nor night day (constant conjunction in sequence): each is brought about by a shift in the position of the hemispheres of the opaque earth in regard to the sun. And again, cloven-footedness does not bring about ruminance, or vice versa (co-existence): each is brought about, so far as we may say, by the develop-

ment, under certain circumstances, of certain elements in a germ-plasm. And this is generally true. The ontological relations other than causality do not connect existential facts which, as connected by them, are such that one brings about the occurrence of the other. This is true only of causality.

There are at least two questions that should be asked in regard to this third part of our definition: (a) does the notion of cause bringing about effect represent facts? that is, are there particular instances of it that are incontrovertible? and (b) can this notion, if it does represent facts, be made any further intelligible? I will consider these questions in the order in which I have stated them.

(a) I think that contrary to certain passages in Hume and to those who follow them, the notion that 'cause brings about effect' plainly represents facts. Thus, after an extended drought it is raining, and as it rains I observe a puddle of thickened rain-water to form in a hollow of the previously parched ground. In this case the cause is the falling of rain at this time to the hollow of the previously parched ground; the effect is the forming at this time in this hollow of the thickened puddle of rain-water. I submit that this cause, which is continuous in our sense with the effect, did, *under these circumstances*, bring about that effect. That, as I think, is a certain fact. Again, a man spreads a coat of brown paint over the surface of a table previously white. The surface becomes brown. I submit that this change from whiteness to brownness of the table's surface, which took place as the painting proceeded, (effect), was, *under these circumstances*, brought about by the spreading of the brown paint over the surface previously white (cause). Finally, a lighted match is applied to a bale of dry hay standing in an open field and the hay takes fire and burns. Again I submit that the

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applying of the lighted match to the dry hay (cause), did, *under these circumstances*, bring about the burning of this hay (effect). To some these examples may seem ludicrously simple, but I fear we have little choice in this matter if we would indicate decisively to certain philosophers that the notion of cause bringing about effect does in truth represent firm and clear-cut facts.

(b) But can this notion of 'cause bringing about effect' be made any further intelligible? In a sense of course its nature is already somewhat intelligible. For since the notion represents clear facts, it is at least a piece of valid knowledge. We may go farther than this, however, in at least two directions. In the first place, the notion can be given a formal definition. Thus: by the assertion that one reality (the cause) brings about another reality (the effect) is meant that the occurrence of the second reality (the effect) is, under the circumstances, due to and determined by the existence of the first reality (the cause). This would be a precise or formal way of rendering the notion of cause bringing about effect and should be of aid to those who are fond of such things. In the second place, a further point may be noted. This is the rôle which the notion has as a basis for at least two types of necessity involved in causality. In a sense, I am inclined to think, we may deny necessity to causality. If we are asked: why, by what necessity, does cause bring about effect? I think that we can only reply in the end: cause brings about effect because cause brings about effect, it is the nature of a cause to do this. In other words, as I think, we cannot reach to any deeper necessity for cause bringing about effect than the fact that it simply does. We must merely accept as rock-bottom this attested truth. Still, I do not think we need to hold with Hume that this disposes of necessity in causality. Several types of necessity remain to causality,

of which two may be mentioned here since they are directly based on the truth of the notion that cause brings about effect. The first type may be called *ontological* necessity and the second type may be called *epistemological* necessity.²⁴ By the first type of necessity we mean that, since cause does in fact bring about effect, a reality, *if* it is a cause, is one whose *nature as an existent* must be to bring about an effect. We may not be able to say why the nature of this reality as an existent must be so, but that it is so we may certainly say if it is true that cause does bring about effect. Such is the ontological necessity in causality. It is that intractable necessity for bringing about an effect which resides in the *existential* nature of the cause. The other type of necessity directly based on the truth of the notion that cause brings about effect, is called epistemological necessity. This may be explained as follows: we have seen that the notion of a reality bringing about another reality supplies the differentiating character of causality, and is involved in no other relation, such as co-existence or constant conjunction. And we have seen that this notion represents clear facts. Since this notion is involved in causality alone, it follows that the concept of causality is required for a knowledge of an area of clear fact. This is what is meant by the epistemological necessity of causality. Causality is required or is a necessity for a *knowledge* of an area of clear fact.

IV

This completes our discussion of cause defined as a state or a change existentially continuous with another state or change and bringing about, under the circum-

²⁴ Another type is the hypothetical necessity of scientific causal laws. But it is impossible here to discuss this topic of necessity in causality at all adequately. One may consult, e.g. C. J. Ducasse, *Causation and the Types of Necessity* (University of Washington Publications in the Social Sciences, Vol. 1, No. 2), Chaps. 6 and 8, and Part III.

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chief aim in this article has been to interpret and defend this definition and to indicate incidentally that in this concept of cause as ontological the distinctions between cause and effect, and between causality and allied ontological relations, felt by common thought, are accorded a place. These distinctions are valid if our concept of causality is stances, the occurrence of the other state or change. Our valid. The failure either to invalidate or to give place to these common-sense distinctions, we said, constitutes the chief blemish of the logical-determination theory of causation. This quite widely accepted theory, insofar as it is true—and it is true simply as stating the correct relation between *propositions* about causes and effects—remains, however, as a supplement wholly consistent with our own theory. This we have suggested. But if we wish, not a half-truth, but an adequate idea from which to survey problems such as the problems of causal analysis, of causal prediction, of universality and causality (to mention only a few of the causal problems), I think we must make merely a gruff bow to this logical-determination theory and endeavor, as we have, to understand causality not as a logical but as an ontological relation.

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DOES CONSCIOUSNESS EXIST?

THE Neo-realist seeks to solve the age long problem of the relation of body and mind by showing that these are not two substances but two forms of the same substance. In pursuance of this aim Bertrand Russell asks, in a recent work, "whether there is anything that we can call 'consciousness' in any sense involving a peculiar kind of stuff, or whether we can agree with William James that there is no 'inner duplicity' in the stuff of the world as we know it, and that the separation of it into knowing and what is known does not represent a fundamental dualism." He comes to the conclusion "that William James was right in his views on 'consciousness'."¹

In considering this problem anew I wish to examine some of the considerations that have led some thinkers to the denial of consciousness, or at least to a denial of its significance.

Traditional psychology concerned itself with the "inner world" of mental states, such as sensations, memories, volitions, images—which are, it held, discovered introspectively—leaving to physics and physiology the task of observing and describing the "outer world." The inner world, it held, is characterized by consciousness, the outer, by occupancy of space; the inner world is private, the outer, public; the outer world can indeed be measured with mathematical accuracy but can never be perceived except through

¹ *Philosophy*, New York, 1927, pp. 210, 217.

the medium of subjective modes of apprehension, while the inner world, although it defies such precise determination, can be, and it alone can be, directly observed.

But it was soon discovered that introspection is a very unreliable method of collecting data, since in the first place, it is necessarily limited to one's own mental states and consequently the field of observation is too restricted to allow of generalization. What right has anyone, it was asked, to base laws of mental conduct upon observations limited to himself? I cannot, by introspection, discover what others are thinking or feeling. How, then, can I know whether they think and feel as I do under similar circumstances?

The scope of introspective data is indeed enlarged if I accept at its face value the reports of the introspection of others. I can then check up my knowledge of my own mental states with what I learn from them as to their own, and conclusions based on the narrow range of my own experience are confirmed or corrected thereby. Thus the objection based on the narrowness of range of introspective data is to some extent met. But a second objection rises, namely, that the reports of others are meaningless to me unless I interpret them in terms of my own experience, so that I am still limited, in the last resort, to my own introspective data. If you tell me you see "green grass" or hear "violin music," your words do not open your experience to my introspection, but have for me such meaning only as "green grass" or "violin music" have had for me at some time or other,—only I now attribute this remembered or imagined experience to the biography of another and not to my own. If you are partly color blind, so that what you call green does not, *ex hypothesi*, look to you as green as it does to me but more like grey, or if you have a keen ear for harmonies and overtones so that vio-

lin music is richer in tonal quality for you than it is for me, I can discover neither fact, except either as you may report to me through other words (which again I must interpret in terms of my own experience) or as I observe your behavior (such as your failure to distinguish colors which I can distinguish or your showing greater ecstasy than I do) from which I infer a difference between your experience and mine; though it is as permissible for me to infer that your experiences are the same but that your responses are in the one case more, in the other less, inhibited than mine. Your own experience, *i.e.*, your mental states, are for me in any case matters of inference and interpretation. Introspection is forever limited to the introspecting subject himself.

But if I am forever excluded from experiencing your experiences, and can know what you are thinking or feeling only as I attribute to you thoughts and feelings similar to my own under like circumstances, as when I see you look at a picture and conclude that you are seeing it, or hear you say, "It is cold," and conclude you are chilly,—even though this be the case, is there nothing that can be indubitably and objectively concluded from the reports of the introspection of others? I give a number of people a set of colored discs and ask them to pick out the piece corresponding to a color shown them. If they all pick out the same piece, and if it be the one I would have picked out, I conclude that they can all discriminate color equally well and correctly, even though I cannot tell to what degree of intensity the colors differ for each of them or indeed whether any of them, being color blind, see all these colors as only shades of grey. I can observe how other people react to situations, in this case how they respond to similarity; but I know of no means by which I can discover

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the exact quality of their experiences. That they have the same experiences as I have when they react as I do under similar circumstances,—this is an inference; for practical purposes perhaps a legitimate one, but one that must in any exactitude remain a matter of doubt to the end. I can observe your behavior, but not your mental states. Indeed, in the color experiment all that I have observed is that you respond in a certain way to certain stimulations. That your differing reactions to different color-stimuli is not merely a mechanical response of your nerves to varying wave-frequencies, but implies a conscious discrimination of seen colors, is a conclusion not depending upon observation but upon my habit of imputing mental states to others. That the subject of my experiment is conscious is something I have to assume, for consciousness is not an object or event I can observe in another. We shall soon see that even this assumption has been questioned.

Assuming for the present the fact of introspection, *i.e.*, that human beings have, and can observe, their own mental states and can report the results of their introspection to others whether by words or by behavior, there is a third objection to this method. The scientific observer ought to be a disinterested spectator, but this the introspectionist can never be. For if he be angry or in love or swayed by pity or fear, his self-observation is colored thereby; and if he takes time to collect himself and to adopt towards himself the unbiassed attitude of the scientific observer, he has thereby modified the states it was his intention to introspect. Scientific introspection would seem to be impossible; at best it is retrospection. And the objection to retrospection is not that memory is fallible—for even in extrospection I cannot both observe and record simultaneously, but must first observe, and then record from memory what I have previously observed, even if it be

only an instant before. But in the case of introspection, while the mood to be observed is occurring I am not even in a position to observe, but must later seek to recall how I felt or what I thought and then observe and record not the mood itself but the mood as remembered. But memory adds and subtracts, and cannot, in the case of introspection, be checked up by turning again to the fact under observation, as can be done in extrospection. For practical purposes introspection may work well enough, but as an instrument of scientific observation it lacks the precision desirable in the so-called exact sciences into whose ranks psychology aspires to enter. The apothecary dare not use scales that would be fully satisfactory to the coal merchant.

But if we cannot check up on our own introspection, can we not check up on the introspection of others as reported to us, by ourselves concurrently observing their behavior, for we can take that disinterested attitude towards their anger or love which they themselves cannot take at the time, and can observe gestures and grimaces of which they are unaware. But the behavior of sophisticated adults is very complex and full of inhibitions; it is easier at first to carry on our experiments with babies and animals. We are still assuming the validity of introspection—within the limits noted above—and are going to subject baby or animal to certain stimulations in order that we may observe the nature of its responses to the emotions which those stimulations are calculated to arouse. We shall make the baby or animal afraid or angry or jealous or happy—*i.e.*, we shall assume that we are arousing these emotions in it—and shall then observe its unsophisticated and uncensored responses. We shall thus be able to tell, as we think, what are the normal reactions to certain emotions and, conversely, to tell from one's behavior what emotions a person

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is feeling, without waiting for his own introspection and verbal report.

I therefore arrange certain laboratory experiments for the observation of adults, babies and animals, to determine if possible the correlation between their behavior and their mental states. And suddenly it occurs to me that instead of correlating their behavior with their mental states, what I am doing is to interpret their behavior in terms of my own mental states. Their mental states are still a sealed book to me, if indeed I have any right to assume that they have mental states at all. For in the same way—but mistakenly as we now think—did primitive man attribute ideas and emotions to sun and trees and arrow. And that type of thought has left its traces in our language. We still say, "Water seeks its level" and "The moon is attracted by the earth," though we now realize that "search" and "attraction" are notions introduced from our own nature and are probably, indeed quite certainly, alien to water and moon. But modern psychology bids us be equally critical when speaking of animals and men. When, for example, I say of a singing bird, "How happy it is!" or see a dog wag its tail and say, "How it loves its master!" I may be reading too much into their behavior. The need for a mate may prompt the bird's song and perception of the source of its food the wagging of the dog's tail; nay, in both cases the behavior may be the result of glandular secretions merely and not of mental states at all. Note, however, that I cannot, so far as the argument has yet led us, deny the happiness of bird and dog, but neither can I indubitably affirm it, for I do not know whether animals react to situations with the same emotions as human beings, or indeed whether they have emotions and feelings at all. Indeed the doctrine is at least as old as Descartes that

animals, like plants and planets, are only machines, no more possessed of consciousness than sun or stone. All, then, that I can with certainty affirm about the bird and the dog is that the one is singing and the other wagging his tail. I can observe their behavior; but I cannot with any certainty correlate this with their mental states, and yet this is what I had hoped by these experiments to do.

And the same is true of savages, babes and infants, that it is difficult to determine their mental states. Is the savage's magic ritual the result of a semiconscious theory of the universe or merely the standardization of spontaneous fear and joy responses? Does the babe's cry mean colic or a pin? When a boy screws up his face and tells me he has a toothache can I believe him or not? In all such cases the behavior is directly observable to the outsider, but not the mental state which is supposed to accompany it. Indeed the question has been raised whether in any of these cases there is any mental state at all. Common-sense is agreed—although philosophers disagree—that there is no consciousness accompanying the stone's downward fall or the river's seaward flow; and our assurance that the same is true of plants is only a little less certain. The poet may sing, "I like to think that every flower enjoys the air it breathes," but common-sense calls that fancy and attributes enjoyment not to the flower but to ourselves in observing the flower. But if consciousness neither can be observed in stone or plant, nor need be attributed to them in any description of their behavior, may not the same be true of the monkey in the cage trying to get the banana, and even of human babies and adults, that the outside observer not only cannot observe their consciousness but does not even need to use the word "consciousness" in describing their behavior? Whether the person is asleep or awake the situation is the same; I can observe

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no one else's states of mind, and I can describe his behavior without reference to such states.

This argument does not yet affirm that I can explain another's behavior without reference to his mental states, but only that I can so describe it. For, so far as I can see, it is theoretically possible, if not always easy or feasible, to describe another's behavior without any reference to mental states. And behaviorist psychology takes its stand on this fact, and on the related fact that, even if it were desirable to appeal to the consciousness of that other, such consciousness has to be imputed to him since it can in no wise be extrospected in him, and he is the only one who can introspect himself. Hence the behaviorist's dogma, that for the purpose of description consciousness is an irrelevant issue; that, indeed, it is not only irrelevant, but often serves merely to becloud the issue; serves, at best, as an excuse for laziness, as when I do not wish to take the pains or the time to observe a certain sequence of behavior through to the end, but observe only part and then say to myself, "That person *intends* to go to the postoffice" or "That monkey *desires* the banana." What I mean in these cases, says the behaviorist, is not that I have penetrated into and introspected the mind of man or monkey, or indeed that there is any mind, conscious intention or desire, there to be observed; but only that I have inferred, from so much of their behavior as I have observed, that were I to observe it long enough I would see the roving activity of man or of monkey cease when the one reaches the postoffice or the other the banana. For the behaviorist, then, what we call "desire" in man or animal implies nothing more than the fact that the man or animal "is stimulated to restless activities which tend towards the performance of some reflex." "We cannot observe whether an animal *feels* satisfaction or *feels* discomfort; we can only observe

that it behaves in ways that we have become accustomed to interpret as signs of these feelings."² We observe, viz., that it is at one time restlessly roving and at another is at rest.

From this denial both of the observability of consciousness in others and also of its significance for description even if it could be observed, it is an easy step to the denial of consciousness altogether. Watson regards thinking as nothing more than laryngeal processes, and other behaviorists differ from Watson not in acknowledging a conscious process accompanying or in some other way related to physiological processes, but in refusing to limit thought to laryngeal processes only. Mental states, other than physiological processes, they all equally deny. "An image," says the behaviorist, "is the recurrence of the physiological state which originally accompanied a given stimulus, under conditions in which the external stimulus is not present." And again, "It seems to me that redness, as such, is just as much a construct as Russell says that matter is. Given two items, light-waves of a certain length and a retina in functional condition, we react with the word red. This qualia, redness, cannot be a part of the object, for that is composed only of electrons and protons in motion; nor can it be a part of the retina, for there is no redness stored there, to be added to the reaction; 'red' is simply our word-reaction to our own physiological state."³

Up to this point the behaviorist argument seems but common-sense. But at this point I must confess myself perplexed; for if there is one thing of which I feel most certain it is this, that I am at the present moment conscious,—indeed my "feeling of certainty" and my "consciousness" are here identical, mean the same thing,—con-

² Russell, *op. cit.*, pp. 90, 32.

³ Ross Stagner, "Reality Not Given in Presentation" (unpublished).

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conscious of brown desk and white walls, of my act of writing and of the ideas I am trying to convey thereby. Not, indeed, am I certain of all,—or, if you will, of any,—of the inferences based on the content of my consciousness. But that I am conscious of a content seems to me, as it did to Descartes and does to Russell, indubitable. People, says Russell, may be “somewhat wary as to the objective significance of their perceptions; but they have remained convinced that they really have the perceptions that they thought they had.”⁴ Indeed, if there were no content of consciousness there would be no point in affirming or denying its accuracy or even its existence, and no call for a theory to explain what is involved in the process ‘thinking I see.’ Whatever else, then, perception may be, it is not merely the compresence of objects in the same space with my ‘mind.’ It involves the awareness that they are compresent; or if you forbid me to use the word ‘awareness’ to explain what I mean by ‘consciousness’—since they are synonyms,—the best I can do is to define my consciousness of anything as the presence of that thing *for me*, as Hegel put it, and not merely *with me*; not for me in the sense of ‘for my sake,’ but for me in the sense that I have transcended the merely spatial relationship. The chair which I see is not “in my head” (Russell notwithstanding);⁵ but it is “in my mind,” not in the sense, of course, that mind is a containing medium, for that is to speak in terms of space, but in the sense that, in addition to the compresence of my body with other bodies in space, I am aware of the compresence of some but not of others. You may explain my being aware of some of these bodies and not of others

⁴ *Op. cit.*, p. 167. Cf. Turner, *A Theory of Direct Reality*, p. 25: “Time, space, motion, and innumerable other qualities are presented in this directly sensed content. . . ; their actual *appearance* is unaffected by all our theories equally, for while these may explain its conditions they cannot alter its inherent character.”

⁵ *Op. cit.*, p. 138.

as due to the fact that "stimuli of various kinds are affecting my organism in one way or another;"⁶ but it does not follow that 'conscious of' means no more than 'affected by.' For it is of the desk itself as something out there in space that I am conscious, and not merely or primarily of its effect on me, *i. e.*, of some neural impression which I take to indicate the presence of a desk which, although in space, is not known in its spatial character but is only inferred as the unknown agent of my impressions. If, in the order of fact, awareness of an object is conditioned by sensory stimulation, in the order of knowledge the being aware of the object comes first and I advance the theory of sense organ and sensory stimulation to explain this awareness. It may be true, as the physiological psychologist affirms, that "I cannot conceive of an idea apart from a neural mechanism any more than I can conceive of the process of digestion going on apart from any mechanism for assimilating food."⁷ But the analogy is misleading, for whereas digestion is the physiological action of the stomach on a physical entity contained within it, ideation is not the physiological action of the neural mechanism upon anything inside or even in immediate spatio-temporal contact with it. To "see a chair" or to "think of Columbus discovering America" is not merely to have certain physiological processes going on in one's neural mechanism under immediate stimulation of sensory organs, originating in that part of space where the chair is or where that which made me think of Columbus is, though this sensory stimulation is undoubtedly occurring; but it is to know that this process refers to an object distant in space or an event distant in time. It is this 'objective reference' of my sensory and verbal responses to something which is entirely

⁶ Ross Stagner, *Constructive Evolution*, (unpublished), p. 13.

⁷ *Ibid.*, p. 14.

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different and distant from them that constitutes the essence of awareness. Consciousness, then, is neither physiological process, on the one hand, nor is it, on the other hand, an intracranial and ghostly replica of the perceived object or a sort of diaphanous spiritual medium through which the object is perceived; it is simply the fact that the object is perceived. When therefore I say that of this I feel most certain, namely, that I am conscious, I do not mean that I am certain of the existence of Spiritual Substance of some sort, intracranial or external, but merely that I am seeing, hearing, thinking, desiring, and at this moment puzzling for words to express my meaning,—leaving the question as to what all this implies for future consideration. You may seek to explain my seeing, hearing, etc., in terms of the activity of a neural mechanism. But whether your explanation is correct or not, the seeing, hearing, thinking which it is calculated to explain—that surely *is*, else had there been no need of a theory to explain it.

That others cannot observe my thoughts, but can know what I am thinking only as I express my thoughts in words or deeds which they must then interpret in terms of what these words and deeds mean to them—this I see no reason to deny. My consciousness is not open to direct observation by others, but only my behavior. But from the proposition that consciousness cannot be observed extrospectively it does not follow that it cannot be observed at all, far less that there is no such process. Others cannot do my perceiving and thinking for me; shall I conclude that I am neither perceiving nor thinking, *i. e.*, that there is no more going on than others might observe, certain neural and muscular movements namely? Like the twelve fishermen of the Turkish story each of whom could count only eleven persons in the party because he failed to count himself, the behaviorist, unable to observe the consciousness of others,

affirms that there is no consciousness at all, because he has left himself, as conscious observer, out of the picture. On this point surely one can agree with Russell, "that self-observation can and does give us knowledge which is not part of physics, and that there is no reason to deny the reality of thought'.⁸" Far from its being true that consciousness cannot be observed, it is in one sense the one and only thing that can be observed, in this sense namely, that it is the condition of there being any observation whatsoever. Indeed are not observation and consciousness but two names for the same process? To observe a thing is to be conscious of it; and there can be no consciousness which is not the observation of something. So obvious does this seem to some, so eminently reasonable and incontrovertible, that when they find it denied—*i. e.*, when they find people who affirm that consciousness is not going on when I am observing something, but only a dance of neural atoms—they are forced either to conclude that all minds do not think alike, so that what seems eminently reasonable to one must needs seem wholly irrational to another,—but to admit this is to deny the possibility of rational converse with my fellows;—or else to conclude that those who deny the existence of consciousness are using the word to mean something other than what they mean by it to whom consciousness is, as I have already said, the necessary condition of all observation and hence the one thing that no psychological or other observer can dispense with as long as he is awake on his job. What, then, does the introspectionist mean by consciousness; and what does the extrospectionist mean by it when he denies that it is anything other than physiological process?

Consciousness, we are told by its critics, is a vague and intangible abstraction, belonging rather to the realm of

⁸ *Op. cit.*, p. 175.

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superstitions and of ghosts, than to the realm of discernible reality. And it may be readily admitted that if you want me to show you consciousness abstracted from all objects of consciousness and existing purely by and for itself, that I cannot do. The consciousness which is the consciousness of nothing does not exist. It is an abstraction. Let this also be freely granted, that even when taken as a constituent element in a concrete whole, I cannot tell you where to look to see it or where to feel to touch it; for seeing and touching are methods of extrospection, and it has been admitted that consciousness is not extrospectively observable. Consciousness is not something seen but the seeing, not something touched but the touching,⁹ and it takes an act of thought, and not of sensation, to discriminate the process from the object. The behaviorist may indeed argue that the process of seeing is nothing other than the physiological process of looking, and that I can see both another person's looking, *i. e.*, his head and eye movements, as well as the object at which he is looking. But I do not see whether he is *seeing* the object, *i. e.*, is aware of it; I see only his looking and the object towards which his eyes are directed. Nor can I see my own seeing any more than I can see that of another. Even if I look in a mirror and there see my eye movements, it is not my seeing which I am seeing but only eye movements. "Seeing" cannot be seen but only "enjoyed," as Alexander says, or "introspectively observed," as the traditional psychologist says. I can by thought only, and not by sense, discriminate my being aware from that of which I am aware. And the reason for this would seem to be that awareness is not a substance to be perceived but is a feature of a complex situation, the subject-object situation, and taken by itself is an abstraction. But to call consciousness an abstract feature

⁹ By 'touching' is here meant not 'being in physical contact with' but 'having the sensation of contact.'

of a complex situation is not to call it an illusion; it is merely to affirm that awareness is not real by itself, but real only in the sense of being a distinguishable feature of a real situation. We must therefore use other means than sense impressions in our search for consciousness; not that we are to be anaesthetized before we search, but that we will not find consciousness as the object of sense, but as its condition.

If, then, consciousness is not the object of sense-perception but its condition, can one give a full and adequate account of it, point out unambiguously its nature, source, and rôle in the universe? This one can no more do than the physicist can give an adequate account of matter, for the completed account of the universe has not been achieved. The multiplicity of problems and the confused thinking that cluster around the notion of consciousness are not however a call to the clear thinker to drop so confused and baffling a notion, for the notion of matter would have to be abandoned on the same ground. It is rather a challenge to the thinker to make his notion progressively clearer. Inadequate theories to account for and explain the fact of awareness must be discarded, but not the fact they are calculated to explain.¹⁰

Shall I then seek to clarify my notion of consciousness by analyzing experience into its constituent and irreducible elements, and with the English neo-realists take consciousness as one of these irreducibles—although admittedly something which cannot be known in isolation but only in conjunction with some physical object which, on its side also, can be an object of knowledge only as it is com-present with this irreducible, consciousness? In so far as this theory means that there is such a situation as 'know-

¹⁰ See the article in *The New Republic*, January 2, 1929, "Behaviorist: L'Enfant Terrible," by Edward S. Robinson, for a fuller statement of this attitude.

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ing,' it is common-sense. But if it means that consciousness could exist by itself independent of any content—and this is what the neo-realist probably does mean, for he is an advocate of the mutual independence of 'reals'—then it is just that kind of hypostatization of abstractions against which behaviorism so loudly and rightly protests. Shall I then pursue my analysis of the knowledge situation—including both the knower and the known—until, with American neo-realism, I at length attain absolute simplicity and irreducibility in those 'neutral' terms or events of which nothing further can be said than that they *are*; for, since they denote everything, they can connote nothing;¹¹ and, being the elements out of which anything and everything is to be constructed, must have no qualities of their own, so that they become indistinguishable from nothing, as Hegel long ago pointed out in his discussion of pure being?¹² From such absolutely simple and non-determinate terms does Holt seek to deduce the universe; but he is successful, if at all, only in so far as his deductive synthesis is but the reversal of the process of analysis by which he had originally arrived at his simples, and not because his simples contain in themselves aught whereby the deduction of complexes can be determined. Humbler than the deduction of reality out of nothing is the scientist's and the philosopher's task. It is his task to take what he finds as he finds it, and then seek to find his way about in it; *i. e.*, to explain experience not by showing why it should have been thus and not otherwise, but by showing how, being such a universe as it is, its parts and features are related to one another.

I can, then, not present consciousness to you as an

¹¹ Cf. E. B. Holt, *Concept of Consciousness*, p. 20, *et passim*.

¹² Hegel, *Logik Werke*, vol. 3, p. 73. For a discussion of the relative merits of analysis and synthesis in "The Search for Certainty" see an article by that title in the *Monist*, October, 1928.

object of that sense experience with which knowledge starts, nor of that completed rationalization which would constitute its goal; nor can I build it up for you *de novo* out of elements which do not contain it, though once having it I can analyze it and then reconstruct it as an exercise in logic. But, finally, I cannot even describe it to you in terms which shall make you aware of what it means unless you are already a conscious being, any more than I could describe redness to a man born blind. "A blind man," says Russell, "could know the whole of physics, but he could not know what things look like to people who can see, nor what is the difference between red and blue as seen. He could know all about wave lengths, but people knew the difference between red and blue as seen before they knew anything about wave lengths."¹⁸ When therefore, I speak to you of red and blue I am assuming that you have or have had visual experiences similar to those I have; for if you have not, my words as words mean nothing to you, and I am speechless in your presence; the rustling of the leaves would mean as much. Let me then assume that you have never had any experience similar to mine and I must perforce give up the attempt to communicate with you in words. But let me assume that you do indeed have experiences similar to mine, then if, when I speak of *sensations* of red and blue, you tell me that these words mean nothing to you but *physiological states of the retina*, I must conclude that you and I mean different things by our words, and not that you do not experience that which I call a sensation, any more than that my sensations are independent of the functioning of my retina. I must therefore assume a misunderstanding about words or a disagreement as to the further implications of our experiences, but not that I am experiencing something wholly alien to you.

¹⁸ *Op. cit.*, p. 174.

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Now, the word 'consciousness' can convey no meaning to a being which is unconscious. If the reader should be unconscious—for he may conceivably be in a trance—he will not be aware of my words, and they will therefore be meaningless to him. But if he should react intelligently to these words I am surely justified in assuming that he is conscious of the words, *i. e.*, that he is thinking about them. And if you reply that what is going on in your case is not thinking but only physiological processes in a neural mechanism, I must, as above, assume that we both have the same experience but are using words differently to describe it. Let me then assume that the behaviorist and the introspectionist both have the same experience, are doing the same sort of thing that I mean when I say I am 'thinking' or am 'seeing the moon;' and our task shall be to discover if possible what meanings introspectionist and behaviorist attach to the word 'thinking' when the one affirms and the other denies that there is such a thing.

What then does the introspectionist mean when he says he is conscious or aware or thinking? He means (or at least I think he means) that he is observing something—doing exactly what the experimental psychologist is doing when he is observing, seeing, a rat in a maze. But the behaviorist will say, "All that is happening in my case is that certain physiological processes are occurring in my body, and more particularly in my neural mechanism; and what you call my awareness or observing is nothing but these processes, for I can find nothing over and above these to be called consciousness." What then shall I reply? Shall I not say, "My dear Sir, are you not observing a rat in a maze? If then there is nothing going on but physiological processes in your neural mechanism, is the so-called rat in the maze only another name for these pro-

cesses?¹⁴ Or in observing the rat, do you not refer these processes to something which exists outside your body and at some distance from your neural mechanism? Now it is just this 'objective reference' of your physiological processes that I mean when I speak of your being aware of the rat." An observer, then, not only has physiological processes, but also knows that these processes mean something other than themselves. Knowing, therefore, cannot be a part of that physiological process, for not only does it transcend it in space and time, since knowing is not confined to the head where the process is supposed to be going on, but refers to objects and events outside the head; but it also differs in nature from this process, for knowing is no more like moving than red is like ambition. It is only in the interests of a quantitative theory that the qualitative difference between change of position and awareness of objects is ignored. It may be that no thinking can go on without accompanying physiological process; but to insist that thinking is only another name for that process is to lose sight both of the objective reference of thinking and also of its qualitative distinctness. It is not enough that a ray of light travelling towards me from the rat in the maze shall reach my eye and make its image on the retina, or travelling to the brain make some impress there,—the same thing can happen with the camera in place of my eye. But the camera does not *know* that it is perceiving a rat, nor indeed that it is perceiving at all, whereas the psychological observer is aware both that there is a rat out there and that he is observing it.

But surely the behaviorist will admit this much. What

¹⁴ Cf. Russell, *op. cit.*, pp. 138, 173. "My percept of a table is outside my percept of my head in my perceptual space, but it does not follow that it is outside my head as a physical object in physical space. . . . all my percepts are in my head, even the most distant star as I see it." Whether therefore I am perceiving a real rat or only an imaginary one, "in the case of the 'real' rat also (one's) primary datum ought to be considered introspective" as in the case of the imaginary rat.

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motive then can he have for denying that 'knowing' is anything other than physiological process? He cannot mean that the 'rat' which he is observing is the physiological process, for he distinguishes between the two; or that in knowing, he is observing the process only, for he is aware of both; or, finally, that there is no observing going on, for he is proud of being a trained and accurate observer.

We have, I think, to go back to the dualistic epistemology of the Cartesians if we wish to understand the protest of the behaviorist and of the neo-realist against 'ideas.' According to the dualist, what I perceive when I see a rat in a maze is not the real rat itself but my idea or mental copy of the rat. My *idea* of a rat does not, then, in Cartesian terminology, mean my awareness that there is a rat; it means the mental image of a rat, of which image only am I directly aware. There are, then, on this hypothesis, two rats: the rat-as-seen or perceptual rat, to be discovered introspectively and consisting of mental stuff, and the rat-in-itself or physical rat, to be inferred but never discovered. The former, which alone I know directly, has the ontological status of a dream, the difference between dream objects and waking objects lying not in the substantiality of the latter, since both are alike mental, but in the orderliness attaching to the latter so that I have to assume the concurrent existence of a 'real' object as the explanation of this orderliness although I never perceive the 'real' object.

Neo-realism and behaviorism alike protest against this unnecessary reduplication of the object of knowledge, the perceived-but-unreal-rat and the never-to-be-perceived-but-real-rat. Russell does, it is true, provisionally reinstate the Cartesian dualism and calls the unperceivable rat 'real' or 'physical.' But his ultimate purpose is not dualistic. It is his purpose to turn the tables on the 'real' rat, popularly

so called, and prove it to be a logical construct merely, a class of events or percepts, the percepts alone being real. Between the rat and the perceiver there is, for Russell as for other monistic epistemologists, no third entity. But he achieves his monism by denying the reality of the 'physical' or so-called 'real' rat and maintaining that the 'perceptual' rat alone is real.

A similar refusal to acknowledge a third entity between perceiver and reality motives behaviorism. But instead of denying the ontological validity of the *physical rat* or rat outside of the head, as Russell does, (Russell is not always true to the logic of his position,) it is the *perceptual rat* or mental image inside the head that is denied. To see a rat in a maze is simply to see a rat in a maze and nothing else. What then of the intra-cranial 'percept,' 'image' or 'idea' of a rat which epistemological dualism places between perceiver and reality as the object preceived, and which Russell elevates to the dignity of reality? There is, says the behaviorist, no such thing; for when I search for something going on inside my head and mediating between rat and myself I find nothing 'mental' but only physiological processes, the activity of sense organs, brain and muscles. Now,—and this seems to be the logic of behaviorism,—if you give the names 'imaging,' 'perceiving,' 'knowing' to what goes on inside the head of the perceiver, and then if you find nothing there but these physiological processes, you will have made them identical with knowing and will affirm that this intracranial 'thinking' is nothing but, in slang terminology, 'brain waves.' That (a) between himself and the rat he is observing there is the relationship called 'knowing,' (which is not the merely spatial relationship of compresence, but is the awareness of that compresence), (b) that it is a real rat he is observing, and (c) that he is aware of what he is doing, is indeed 'thinking

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about' the observed rat with a fair degree of logic and rationality such that he can write a book about it,—all this the behaviorist so fully takes for granted that he does not find it necessary to acknowledge it. When therefore others talk about 'consciousness,' he affirms that he can find no such thing, not, I should imagine, because he would deny that he is aware of or observing things, but because he does not find consciousness itself as an object or event inside his head, or, for that matter, outside.

A similar logic do we find in the behaviorist's treatment of memory. He asks me what I am remembering when I remember a past event. The obvious answer is that it is the past event itself I am remembering. To common-sense this is surely as evident as that when I see a rat I am seeing a rat. But, he will say to me, surely your remembering is a present event; how, then, by means of a present event do you remember a past event? And he gets me all confused, so that what once seemed obvious is now uncertain. How can I by a present act of remembering reinstate a past event? Surely what I am conscious of when I remember is the present act of remembering the past event and not the past event itself. Thus does he argue; and yet all the time it is the past event itself of which he and I are thinking and talking,—for if we were not thinking of the past event how should we know that the present act of remembering is not that past event? If I cannot know the past through my present act of knowing, the affirmation 'that I cannot know the past' is both meaningless and impossible.

The behaviorist, I take it, no more intends to deny that I can remember a past event than that I can see an external object. When he denies 'memory,' as formerly he denied 'ideas,' it is surely not this valid fact of remembering which he denies, but this third entity which is supposed to

come between me and the remembered event. According to the point of view which holds that when I perceive an external object it is not the external object itself but a mental copy thereof which I perceive, it is also held that when I remember a past event it is not the past event itself which I remember but a present mental copy of it, qualified in such a manner as to function as the 'memory' of the past event. Now this 'memory' which is neither the past event,—since the memory is a present one; nor the act of remembering,—since it is the object of that act; but is something which intervenes between the past event, which cannot be reinstated in memory but is nevertheless in some mysterious way known to have occurred, and the act of remembering, which does not really remember a past event but only perceives a present memory of the event,—all this fol-de-rol would the behaviorist sweep aside. When, apart from past event and present act of remembering it, I look inside my head for 'memory images' I find only physiological processes. If I am a good visualizer I may see in memory the breakfast table I left an hour ago; but this visualization brings before me not a table in my head but the breakfast table in the other room. When therefore I 'look inside my head'—and it is interesting to note that this is what both Russell and the behaviorist take 'introspection' to mean—I find there neither the real breakfast table nor a mental copy thereof, but only retina, optic nerve, brain, and their activity. In as far as memory is a process going on inside the head this is all it is. This is surely common-sense, and if this is what the behaviorist means we can surely agree. Not that remembering is physiological process, but that to remember a past event is to know that there was such an event, and not to be limited to the contemplation of a hypothetical mental copy of that event. It is surely this hypothetical intra-cranial mental

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memory-copy which behaviorism intends to deny, and not the fact of remembering.

To conclude, if the behaviorist had meant what his critics took him to mean,—viz. that there is no such thing as perceiving objects, remembering events, and thinking about them,—then we should have had to acknowledge that he and his critics possess two diametrically opposed types of intellect, so constituted that what seems most reasonable to the one is arrant nonsense to the other, and what seems most certain to the one is to the other most uncertain. But if we admit this, then must we deny all possibility of intelligent converse between the two. If, on the other hand, we assume that the behaviorist and his critic are both sane and sincere, and sufficiently similar in their experiences that they can hold intelligent converse, we must then ask ourselves what 'consciousness' can mean to him who affirms that it is the one thing most certain, and what to him who affirms that he can find no such thing. We find, I think, that the two use the word to mean different things. When the introspectionist speaks of consciousness he means the self-transcendence of the physiological process, its objective reference, this fact of meaning something other than itself. But sometimes he has talked as if consciousness were a substance, an object, were such a thing indeed as might, like sun and moon, continue to exist even if no one were conscious of it. It is consciousness in this second sense that the behaviorist denies, and surely with ample justification, even as Hegel had, a century gone by, already pointed out that mind is subject, not substance. But in denying a false concept of consciousness the behaviorist tends to overlook the other meaning of the word and so goes too far. For it is only because he is *conscious* of the abuses that have crept into philosophy under the aegis of

this somewhat baffling idea that he finds it desirable to deny its validity. Were he not conscious, he would neither affirm nor deny. If then his words had meant what at first sight they seemed to mean, I must either write him down a fool for holding views that to me are utterly incomprehensible, or myself a fool for utterly failing to comprehend him. It is more flattering to both of us to suppose that he means something else, something comprehensible to both. This paper is an attempt to state what he probably does mean and to express agreement with him if this interpretation be correct. The critic of behaviorism may have been condemning an attitude which the behaviorist himself does not hold; but the behaviorist has laid himself open to misunderstanding through his terminology, that is, through identifying 'consciousness' with the discarded 'ideas' of epistemological dualism.

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NEO-PTOLEMAISM IN RELIGION¹

THE spirit of our times is hospitable to novelties. It is predisposed to believe that what is later is more desirable, and that what is new is, if not good, at least better. On occasion, this spirit is even deliberately capitalized. At any rate, a proclamation of novelty is almost invariably issued whenever grounds therefor are at hand. In the realm of theory, however, continuity is an asset, as it is the rule. Hence it is that we have acquired a large number of neo-isms. In philosophy, we hear much of neo-realism, neo-Kantianism, neo-idealism, the new naturalism, the new psychology, and the new morality. To this exploiting of novelty by terminology, however, there is one conspicuous exception. It is to be found in the case of that particular doctrine in the philosophy of religion which might fittingly have been christened neo-Ptolemaism. This designation, however, has remained without adoption. The proponents of the view in question have preferred instead to claim part title, along with other groups, to the label 'humanism.'

Within the religious outlook, man's estimates of himself and of his importance in the sight of his deities have oscillated widely. Speaking of western Christianity however—as we shall for the most part do in all that follows—one may safely say that dominantly, and in comparison

¹ Read as the address of the President of the Midwestern Division of the American Theological Society, before the autumn meeting of the Division, in Chicago, November 25, 1929.

with other things of the created world, the individual and the society to which he belongs have occupied an exceedingly enviable status; indeed, they have been regarded as in the focus of divine regard. Herein lay one of the chief sources of the psychological strength of geocentrism. To the religious consciousness of medievalism man and his abode seemed indisputably to belong at the very center of God's cosmos. Hence the severe attack that was made upon the rising Copernicanism. To be sure it has sometimes been said that Copernicanism affected simply the externals of the contemporary Christianity. Emphasis is placed on the fact that the new doctrine made untenable the more crassly anthropomorphic conceptions of God and shattered existing notions as to the locations of heaven and hell, and, indeed, the prevailing cosmology in general. That this was indeed the result of Copernicanism, and, what is more far-reaching still, that the very principle of authority was threatened by it, is obvious even to the first glance. But a second look will disclose one thing more, and it is especially this that disturbed so profoundly the religious sentiments of the day. In an order within which the earth itself is subsidiary to another celestial body, and is but part of a system that in turn is of but microscopic significance in the incalculably vast multiplicity of worlds extending into a limitless beyond, how difficult to preserve the religiously vital sense of the supreme worth of man or the conviction that upon him is centered the divine thought and love.

Thus it was only through a fierce and prolonged wrestling of the spirit, and as the issue of the most poignant suffering, that man eventually won his way to religious serenity within the cosmos that displaced Ptolemaism. Irresistibly, even though slowly, the measureless enlargement of the spatial order, and the ultimate demolition of the

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narrow time dimensions of biblical cosmology, prepared the way for a magnified conception of the object of religious devotion. They led to a god-idea of immensely greater comprehensiveness, as in the case of the Spinozists, for example, or of vastly enhanced power and majesty, among circles which held fast to the doctrine of transcendence. In this latter case, God was likewise credited with an unspeakably deep love, for, despite his indescribable power and glory, he was nevertheless conceived to brood over man and to hold precious each individual soul. The religion that thus evolved throbbed with a truly cosmic emotion and in so far proved infinitely sustaining and deep. Nevertheless, it easily led to a haunting realization that the ways and thoughts of a god such as it came to possess could no longer be conceived in analogy with those of his creatures. God at such times seemed afar off. In seeking him many confronted a yawning gulf so broad that even their most active imaginations were abruptly checked at its brink. Beyond the utmost reach of imagery and definite ideas, the god that had come to be was suspected, in due course, of an inability to make himself directly heard by the human soul or felt in the events of nature and history. In consequence, he lost his appeal to many a religious consciousness. He became as unreal as he was remote.

Involved in this issue were influences connected with the development that culminated in Newton's *Principia*. The period was one that gradually brought to consolidation the idea of invariable laws of nature. Among the educated classes, at any rate, the external world came to be regarded as an inexorable order of events. Because of its rigorous and rationally luminous structure, the science of mechanics became the model for knowledge generally. As regards physical nature, tenable and objective knowledge was construed in terms of data which relate to events within a

spatial and temporal world and which are organized by various pervasive principles, particularly that of causality. The known world, that which constitutes the object of rational self-conscious experience and of science, was conceived as a unified order of elements or substances existing in spatial and temporal relationships and conformable to universal laws of causation. Such a world cannot admit the effective invasion of specific activities on the part of a transcendent will or being. God was thus shorn of his direct practical rôle in the world of man's knowledge and practical concerns. He could survive only as an absentee power, without real influence upon or within the existing world order, but related thereto, in any practically significant way, only at some point in the infinitely distant past when, for aught that is demonstrable to the contrary, he may have brought it into being. The consequence was that, however much or little he might factor in cosmological theories, he could not retain for the religious consciousness that vital and centrally significant place which he had previously held.

But the religious spirit demands attachment, for religion is a mode of consciousness that is directed upon, and finds its orientation in, an object. Under the circumstances this object was not unnaturally sought among the realities more immediately at hand than was the pale figure of the far distant god of the speculative imagination. So the search turned to the empirical order of space and time. May there not be, it was queried, within the very bounds of the earth itself and of the life of history as it has run its course and plunges into the future, something to which the religious spirit may turn for the fulfillment of its needs? This question took crystallization midst a welter of influences that conspired to divert the interests of men to the values and the possibilities of the historical life of man-

kind: influences connected with a rising knowledge of the rich civilizations of antiquity and the deep satisfactions which they mediated; with the discovery of new lands and untold resources holding forth high promise to men of adventurous courage; with the elaboration of modes of investigation yielding a type of knowledge that pointed the way to the control of nature and of man, and that therefore spelled power; with the growth of social and political liberty and the increasing emancipation of the individual from direct ecclesiastical interference; with freer social contacts and widening sympathies. Thus came a changed orientation and a new set of values. With a fuller sense of indebtedness to others that had gone before, with a deepened gratitude that intensified the spirit of social devotion, and with an enhanced power born of scientific knowledge, it seemed that perhaps an individual might satisfy the full requirements of his nature through the direction of his conscious interests, and the unreserved dedication of his energies, to his life within, and to the furtherance of, that human society of which he is a member. It seemed that he might perhaps establish a religiously significant relation of gratitude and high respect, if not of worship, and of determined moral service, if not of ultimate confidence, to that obviously real and thoroughly empirical order of spirits to whom he seems so obviously indebted for much that he deeply prizes and to whom he owes and may zealously render his utmost devotion. For is not such a relationship one that is free from outworn superstitions and from solicitations to vain illusions, one that unifies life, meets its most insistent demands, and provides adequate opportunity for the expression of all its capabilities? Have we not in mankind a religious object that remains for us solid and compellingly real, thoroughly convincing in its contrast with the imaginings of the in-

veterate theologian and the airy speculations of the cosmologist and metaphysician; an object of rational and controlled emotions rather than of vague feelings and mystic sentimentalities; an object directive of practically significant and socially valuable conduct in lieu of strange and futile cult activities? Thus arose the call to an anthropocentrism and a neo-Ptolemaism in religion.

Odd, nevertheless, the phenomenon in part remains. It was in a large measure faithfulness to the leadings of science that originally impelled deeply reluctant men to abandon the sheltered confines of Ptolemaism and to strike out into the wide expanses of reality, there to carry on their religious lives midst limitless horizons. Today the same faithfulness is appealed to—among other factors—in behalf of a retreat from the larger cosmos to a tiny world thereof, in order that, unexposed to besetting vagaries and threatening confusion, man may possess an object indubitably real while yet allegedly worthy of religious attitudes and adequate for religious needs. The movement in question has, to be sure, been a spiral one. The end is significantly different from the beginning. The religious society of original Ptolemaism included transcendent members—these indeed were its rulers, among whom one was vested with autocratic and absolute powers. Such members, however, modern sentiments of democracy, and the empirical, if not the positivistic, notions of today, preclude us from retaining within the religious group, or from giving even a speculative recognition. Accordingly the earlier dependence upon the divine has been superseded by reliance on one's self and one's human fellows. The sense of helplessness has given way to confidence in the power born of scientific knowledge and sustained by the enthusiasm of an unyielding will. The petitioner has become the creator.

Thus, while we again today have a Ptolemaism in re-

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ligion, this is not a mere reversion but is clearly neo-Ptolemaism. It involves an outright and consistently maintained rejection of the transcendental. Moreover, it thinks of religion in terms of the requirements of human life in its relations to the empirical environment. It regards its function as essentially practical, and hence strongly tends to identify religion with social idealism.² It is essentially anthropocentric. Nature for it seems for the most part but incidental, receiving serious consideration only insofar as it impinges on human aspirations or affords a leverage for human advancement. Whether it presupposes or implies a comprehensive world view or a metaphysics is a point concerning which its spokesmen speak hesitatingly yet seem disagreed.

II

Humanism is evidence that religion must perpetually reckon afresh with all the various forces of culture. Whatever may be the teachings or the implications of religion regarding the enjoyment of peaceful bliss, it itself, since the age of self-consciousness, has quite generally been in the thick of things, and it is probably doomed to perpetual strife. Realignments in social and institutional life, and radical shifts in the nature and relative strength of human interests, introduce conditions in which religion is unable to enjoy the immunities of a mere bystander or a neutral. Such changes have always impinged upon it, sometimes for good but again ominously. In modern times, for example, state, school, hospital, club, social agency, community and cultural centers, and the like, have exhibited

² In view of the difficulty which this doctrine has in giving to religion genuinely distinct functions and values, must one not suspect that the retention by its representatives of the good old word "religion" evidences simply a reluctance to forego the sentimental assets of a term? Living in such a glass house, neo-Ptolemaists might prudently refrain from continuing an analogous charge against those who retain the term "God" in spite of the fact that they are unable to give it a definition either precise or adequate for logical requirements.

an independence and have asserted prerogatives proportional to their rapidly increasing vigor. In the face of them, religious institutions have continuously felt compelled to fight for the preservation of distinctive functions, that is to say, for their vitality. Shifting indeed have here been the areas of competition and the lines of conflict. In some form or another, however, religion has been involved in them ever since institutional life has tended towards increasing differentiation and specialization, and its various organs have intensified their claims to independence.

When we take note of religion's attempts to stake out her claims in the realm of human interests and values, the past centuries present a record of claims and counterclaims. Conflicts in views and theory have been unintermittent. Religion entered the modern scene as the revealer and mediator of the transcendent, and by virtue hereof as rightfully dominant in all phases of the life and culture of the individual and of society. What this means in one of its aspects is vividly portrayed by James Bryce in a passage which, though familiar, continues to stir our imaginations. "A life in the church," we read in *The Holy Roman Empire*, "through the church; a life which she blessed in mass at morning and sent to peaceful rest by the vesper hymn; a life which she supported by the constantly recurring stimulus of the sacraments, relieving it by confession, purifying it by penance, admonishing it by the presentations of visible objects for contemplation and worship, this was the life which they of the Middle Ages conceived of as the rightful life of many, the ideal of all. The unseen world was so unceasingly pointed to, and its dependence on the scene so intensely felt, that the barrier between the two seemed to disappear." In medieval Christianity the full sweep of religion was in evidence. As the guardian of truths and values eternal and unchallengeable, the or-

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gans of religion held the rôle of arbiter in thought, taste, and conduct. The direction of all the several lines of temporal pursuits was in their hands. The kingdoms of this world and those of truth were assigned by religious authority to their respective provinces. Reality as a whole was deemed a hierarchy of forms and values. The lower substances, it was thought, indeed actualize their own distinctive forms, yet they were believed to possess a wider meaning. They were conceived as the material conditions for the actualization of the next higher forms, leading to man, who, in turn, aspires to the realization of a rational life, culminating at length in the contemplation of God. Thus the final reality and the goal of all nature was found in God. Knowledge reached completion when it passed over into religion and attained a conscious realization that everything must be construed as pointing towards God.

Thus religion was for a time the uncontested ruler over all the domains alike of idea and ideal. But then revolutions broke forth. Religion found herself confronted by a succession of vigorous claimants who sought at once to deprive her of her celestial domain and to secure for themselves increasing powers and eventually even undivided authority in one after another of those realms previously subordinate to her. Though religion was gradually forced to reckon with these claims, and to come to terms with them, she has stubbornly resisted complete surrender. She has sought to preserve for herself some territory beneath the sun, some place all her own within the system of human values and active cultural interests. This has involved her in perpetual intellectual conflicts down to the very present.

The struggles that ensued have been on shifting fronts. Generally speaking, the first challenge to religion was in

respect to her claims to the field of knowledge. Here she had not restricted herself to affirmations regarding the transcendent but, characteristically, had set forth and defended as infallibly true many specific teachings concerning the earth and its relation to the firmament and its bodies; concerning the forms of life that occupy the earth, more especially man—his origin, nature, needs and salvation; concerning human history, particular events of its past and still to come, as well as a sweeping philosophy of its meaning as a divine drama. Scientific investigation, however, pursuing paths of its own by use of a new compass and of novel methods, reached results divergent from religious teachings, even negating some that seemed to be of foundational significance. The new results were no less capable than the earlier of organization into comprehensive systems; on the other hand, they possessed the tremendously convincing advantage of definite vindication by phenomena of perceptual experience, as well as of conferring upon man extensive powers in the way of prediction and control. Suffering from these heavy handicaps, the dictums of religion were unable to maintain themselves. Ever more widely and clearly it came to be recognized that the facts of nature and of history, of man's own being and that of society, could be captured by scientific procedure alone, and that those who commanded the specialized techniques of the various sciences must be given the protectorate over the domains of truth. Of all these, then, extending to the outermost boundaries of actual or possible experience, religion was dispossessed. Religion, it was felt, could not be respected unless it renounced its claims to satisfy man's cognitive needs. If it undertook to assert itself in this field it was exposed to the peril of losing the genuine respect of all who would not be traitors to the truth as declared by a critical and disciplined reason operating with scientific

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Many there were who long continued to argue that, while science was an organ of truth, its findings were in essential harmony with what religion had long taught. The attempt was to prove that, although science made its discoveries independently, the same teachings had previously been proclaimed by religion. This attempt, however, was so awkward or led to such casuistry and violent perversion of plain meanings that those who sponsored it fell under the wide-spread suspicion of ignorance, stupidity, or duplicity. The outcome was the generally accepted belief that scientific knowledge is not merely authoritative as respects questions of specific fact but that it also represents something altogether distinct, in character and intent, in point of view and in conclusions, from anything which religion is competent to undertake. He who would read the books of nature and of life in prose must go to disciplines that are independent of religion.

In some quarters, to be sure, the question was raised whether religion did not possess the cognitive function of supplying the truth about a supernatural and a metempirical world. But how, it was answered, can there be knowledge of anything that does not fall within that ordered realm of events which constitutes our world of space and time? How, indeed, can we as much as know that there is a God, since no deduction or argument can with confidence carry us to any reality that falls outside such a world? Thus it was, for example, that an examination of rationally grounded theistic arguments convinced Kant of their irremediably defective nature.

Today it has become clear that even this negative conclusion of the *Alleszermalmer* of Koenigsberg was not without positive significance to religion. What was crushed

was a formalism and at most an abstract rationalism which, whatever its powers to charm the theologian, was of no vital importance to religion but on the contrary was even a decoy luring religion to extinction. Not upon the materials destroyed by Kant does or can religion sustain itself. Then, also, Kant's argument, whatever its ravages, left to religion a number of distinct possibilities in the economy of human interests and life. Did not the critical philosopher himself say that his removal of knowledge prepared the way for faith? Or may not perhaps the experience of beauty mediate a living consciousness of ultimate purpose and value as expressed in that world of phenomena which we know? Or, again, may not religion perhaps have a share in the domain of conduct? Indeed, is it certain that man's rational nature is triadic, and that outside truth as the value of the intellect, beauty as the value of sensibility, and goodness as the value of will, there remains no other function of consciousness with a corresponding value in the culture of society? All of these possibilities, and others, were explored, and need to be re-explored, before passing to the conclusion that religion is not an independent feature or type of experience but that the word survives and, for sentiment's sake, we will preserve it under the shelter of social idealism.

Now while Kant had contended that the limitations of knowledge leave room for faith, it was soon apparent that in his doctrine, as most generally formulated, faith reintroduced the very conception of God to which the rationalistic procedure of contemporary deism had come. If, however, religion is an expression of faith rather than the pursuit or the conclusions of knowledge, this faith is certainly not one that simply reinstates conceptions originated by a knowledge that has stepped beyond its legitimate boundaries. Hence various thinkers renewed the attempts

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to extend the scope of knowledge beyond the frontiers of what Kant conceived as the phenomenal world. The result was a considerable variety of contentions. For example, it was urged that one need but interpret as regulative the various principles which Kant regarded as constitutive of experience, and scientific knowledge appears in its true light, namely as something partial and abstract, requiring completion through more concrete modes of apprehension and the use of categories capable of yielding wider and more coherent systems of fact and meaning. Or, again, one need but take seriously the correlativity of the subject and object within experience, and realize that, as regards both its existence and nature, the object is dependent upon the subject, to understand that spirit is a central feature of reality, if indeed it is not the absolute within whose experience the correlatives of subject and object, and all relativities, are included. Still again we are asked to bear in mind that science has discarded the view of inert lump matter in favor of a dynamic conception; that the principle of causality can no longer be regarded as holding of all entities within reality; that the appearance of continuous and determinate orders of events is but a mask of discontinuity, due to the fact that individual events, subject alone to laws of probability, are taken *en masse*; that evolution must be recognized as a process not of the unfolding of something given but of the emergence of much that is genuinely new. When considerations such as these are kept in view, it is urged, we find indicated a conception of reality significant to the religious spirit. Or, still again, it is argued that the events which constitute the actual world must be construed as individuations or materializations or embodiments of universals or subsistents which constitute the wider realm of reality, and that a principle of concretion must be recognized if we would

deal at all seriously with the problem of our empirical order of fact in its relation to the subsistential realm. These allusions to different metaphysical doctrines need not be multiplied in illustration of widely prevalent contentions that the limits to which Kant restricted knowledge are altogether too narrow and that reason may and does yield a metaphysics which in no wise confronts us with the simple alternative of a humanistic religion or a religion that retreats to realms impenetrable to knowledge and presumably the creation of desires rebuffed by the circumstances of real life.

Humanists, as was above indicated, have differed on the question whether their doctrine of religion either implies or is implied by some specific form or forms of metaphysical outlook. Some there are who would keep their religious thesis clear of any connection with a cosmology or general philosophy. Others, however, represent it as the logical resultant of an empirical approach to philosophy and, in particular, of naturalism, either of the reductive or of the evolutionary type. The strength of these positions, however, is then assumed rather than seriously argued. If it is reductive naturalism that is taken as the ground of religious neo-Ptolemaism, the stability of the latter is indeed precarious. For if the history of philosophy has taught any lessons at all, one of them assuredly is the fact that a disregard of certain features of a situation, for specialized scientific or other purposes, does not in fact annihilate these features, much less cause them never to have been at all. The philosophy which starts with the body of knowledge represented by some one of the mathematical or natural sciences, and asserts that this exhausts the fullness of whatever may be called real, and that reality is nothing but what appears in the selected body of knowledge, is certainly very naive or stubbornly blind and un-

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teachable. So much is affirmed even by naturalisms of the evolutionary stamp. Those humanists, however, who appeal to a naturalism of this latter sort need to give more careful scrutiny than they have as yet done to the question whether their religious thesis does as a matter of fact follow from the philosophy they invoke. The theistic conclusions to which Lloyd Morgan came are at least a warning to this effect.

There is a further consideration of such significance in this connection that it may not be passed without a word. Whatever may be the particular background of naturalism against which religious neo-Ptolemaists project their views, it involves the doctrine that man is thorough-goingly organic to nature. He sprang from the loins of nature, and from its resources he has drawn his growth and powers. His natural history is his complete history. Once, however, this theme is developed by neo-Ptolemaists, generally by way of a radical antithesis to the dualisms of supernatural and transcendental philosophies, the mood shifts from the major into the minor key. Nature is now supposed to be alien to man. The physical environment, at any rate, is construed as hostile to his finer ambitions or, at the very least, as unsuited to his spiritual realization. Creatures of neglect and enmity, like birds of a feather generally, tend to become all the more deeply united and attached to one another. So human beings, recoiling from the cold and perilous cosmos, find in their relations to one another the requisite strength and objectives for the highest living. To a critic this recovery of good from an alien and hostile world seems but another testimony to man's ineffaceable tendency to give a favorable reading to his environment.

It must indeed be fully admitted that no person should, and that no serious person will, be content to keep his re-

ligion in a water-tight compartment, unexposed to the currents of scientific and philosophic thought. These currents must be allowed free opportunity to transform so far as they may the religious outlook and experience of the individual. A shift in world view should and will reflect itself in religious feeling and action. Conceding all of this without reservation, it must nevertheless be remembered that a world view should not be dictated by any one phase or element or specialized interpretation of experience—by sense perception, mathematics, any one of the sciences or even all of them collectively, aesthetic appreciation, ethical values, or religious attitudes. In metaphysics, as in political life, conformity to principles may legitimately be exacted only where the constituent members have been allowed an influence in the shaping of the ruling norms.

Humanists, in epitome, are not agreed as to whether their doctrine derives its strength from the fact that it is implied by a certain method or doctrine of philosophy; those who hold that it is, have failed to demonstrate that the relation of implication does as a matter of fact hold; and even were the relation established, the doctrine would have all the uncertainty that attaches to the basic philosophy. He would be reckless indeed who alleged that humanism is dictated by the present state of scientific and philosophic knowledge. Such a contention should be but the last resort of a humanist after he had failed to induce conviction through a psychological analysis of experience or through appeal to the facts of religious development.

What light, we would now turn to ask, may be gained from those who teach that we may catch the distinctive spirit and expression of religion in connection with the aesthetic experience? Of those who have so taught perhaps it is Fries who will best serve our present purposes. For, on the one hand, Fries specifies those experiences

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which *prima facie* impress us as disclosing within our phenomenal world the presence of the real and the divine; they are, he teaches, feelings of purposiveness that attach to our apprehensions of the beautiful and the sublime. This analysis of experience, moreover, Fries supplements with an elaborate argument designed to substantiate the validity of these impressions or feelings of purposiveness.

As convenient an approach as any to Fries's doctrine will be by way of the argument through which he seeks to establish what type of experience it is in which that which is real and divine might be expected to manifest itself. This argument rests on a conviction, strongly fortified by Kant's *Transcendental Dialectic*, that reason by its very structure leads to antinomies whenever it addresses itself to ultimate problems. For, knowledge must be of the definite and limited, whereas reason is dissatisfied with anything short of the infinite and unlimited. All attempts to conceive the latter, however, yield an apprehension of but the limited. Everywhere thought experiences a limit, yet no less certainly has it, as the very precondition of this experience, transcended the limit in question. That a radical antinomy may infect reality is not credible, so long especially as we may ascribe the antinomy to the very structure of thought. In sum, cognition is capable of presenting only a phenomenal world. The world of real being, though to reason a necessary and a priori idea or ideal, remains as to its nature an object of faith. Regarding it the only legitimate affirmations are denials of those limitations that pervade our known and knowable world; we may assert of it absence of conditions, or freedom and eternity, and absence of compositeness and multiplicity, or unity, such as is represented by God. Man, however, is not a knower only but also a moral agent. He pursues ends, and these, when morally required, are not conditional,

hypothetical and instrumental but are unconditioned and categorical; they are absolute and self-validating, and as such they do not point to anything beyond themselves. Such an unconditioned end is moral perfection. Here, then, we have the clue to the character of an absolute. Thus do we acquire the connotation of that conception of ultimate and real being which to thought is a necessary idea but is through it definable only by way of negations of the limitations of the world as known. Reality, that is, is a realm in which the moral end, that is, the absolute, is realized; it is a society of morally perfect beings completely harmonious with the ruling will of God. But reason will not rest at this point. It demands a unification of the real and the phenomenal orders. It harbors a conviction that there is a significant connection between the two. If such a connection obtains, the phenomenal order must involve an expression or revelation of ultimate reality. Since, now, our clue to the nature of the real is furnished by moral experience, we must conceive reality in terms of purpose. Hence we may conclude that the unique feature of the phenomenal world in which reality expresses itself is that of purposiveness. Purposiveness, however, can be shown not to be a valid category of theoretical interpretation; we may in consequence be sure that it is a feature of the world that we intuit or feel rather than know. Now Fries held that in the contemplation of beautiful or sublime phenomena of nature, works of art, or human personalities we have a convincing feeling of purposiveness, and the argument which we have just sketched is utilized by him to validate the claims of this feeling. The feeling itself he construes as divination and as representing man's religious nature. Thus, though conceding to an independent theoretical interest the cultivation of a knowledge that is organized by universal principles, Fries retains for religion

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the function of yielding, by way of a characteristically aesthetic experience, a genuine glimpse of the real and the divine.

But is such a view unimpeachable? Obviously not, if only for the reason that it is extremely doubtful whether aesthetic contemplation under ordinary circumstances actually involves such a sense of purposiveness. Moreover, the aesthetic experience is in essence one of enjoyment. Religious experience, in contrast, contains an element of poignancy: consider, for example, the repentance and remorse inevitable when a consciousness of the divine impels an individual to an honest probing of himself. Is, furthermore, the religious experience one singly of admiration and adoration, or does it likewise carry an urge to deeds of service? Is, for example, the Christian's attitude toward Jesus, *qua* religious, that of admiration and aesthetic satisfaction alone, or also that of a discipleship which, refusing in contemplation to detach itself from the world and to escape its tragedies, endeavors, through its discipleship and sacrificial living, to vivify the experience of a universal source of finite spirits and to promote the claims of social justice and good will? Still again, is religion a consciousness of ultimate, static, and changeless being, or an active relationship to a living will operating to sustain whatever incorporates values and to create new worlds and heavens? In short, aesthetic sensibility, in common with the truth quest, lacks features which religion must be conceded to possess. Whatever may be the connection of the aesthetic or the cognitive life with religion, neither the one nor the other is to be identified with religion or is to be regarded as disclosing in some way a metempirical, supernatural world where religion dwells apart.

Does this suggest the conclusion that the characteristic spirit of religion is to be found in the activity of volition as

this culminates in the moral life and more especially in humanistic loyalties? Anthropologically speaking, of course, religion and morality have at times been quite distinct. The former has declared indispensable acts with reference to which morality as such was quite indifferent or to which, indeed, it was even hostile; and, conversely, lines of conduct dictated by morality have been outside the purview of religion or on occasion even condemned by it. At developed levels this cleavage strongly tends to disappear, but now we find that the moral consciousness, having become reflective, insists that moral principles, *qua* moral, are independent of supernatural origin or extrinsic sanctions. Morality postulates the autonomy of the rational agent or it ceases to be more than a hollow sound. At this point in his thought, Kant, under the pressure of finding a distinctive rôle for religion, referred to it, in its subjective aspect, as the recognition of all our duties as divine commands. The thought is difficult to maintain. Whoever lives as he ought, according to Kant, serves God in the only manner acceptable to reason. And it is not desirable that the thought of God be superadded to the consciousness of the moral imperative, else the purity of the ethical motive may be prejudiced, and man may be tempted to act from other considerations than solely out of reverent obedience to the commands of duty. In any case, morality stands in no greater need of a religion other than itself than does knowledge. It must ascertain its duties by ways characteristic of itself, and these duties must be faced without regard to considerations relating to any world other than that of physical nature, the human individual, and concrete social life. However moral theories may diverge, they are today essentially at one in holding that the discovery of what is ethically required and the motivations for living accordingly are matters for which

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religion need not be invoked. Such discovery is properly the task of intelligence or of the moral reason, and such motivation must be sought in developed and socialized feeling-impulse.

Morality, like knowledge and art, expresses the life of reason and develops in the soil of experience. It comes to fulfillment in the form of a distinguishable and autonomous human interest. Like cognition and sensibility, volition opens no window into the hyperempirical toward which religion may turn and thus differentiate itself from all that concerns itself with the empirical. Religion, however, has always been more intimately associated with ethical living than with either truth-seeking or the enjoyment of beauty. In view of these considerations would we not do well frankly to identify religion with morality? Such seems to be in the minds of many who have reached humanistic conclusions. They construe the primary functions of consciousness as cognition, feeling and will, and their goals as truth, beauty and goodness; and they concede to each of these primary functions thorough autonomy in its own expression. On the other hand, they reject all notions of a transcendent reality. What other conclusion is possible, they seem to feel, than that the only reasonable view of religion is in terms of social idealism.

More recently than Comte, and over a path all his own, the profound philosopher Hermann Cohen reached a kindred view. Religion, he pointed out, had its origin in myth. The same is true of science, art, and morality. These, however, speedily freed themselves from the conditions of their origin and pursued independent lines appropriate to them. Religion, on the other hand, seemed for a long time to depend upon its association with myth; it seemed to feel gods and other elements of mythology to be indispensable. Yet the germs of something higher were

here too manifest far earlier than is sometimes believed. The development from polytheism to monotheism, for example, is not so much a matter merely of a reduction in the number of gods as it is a renunciation of mythology in favor of morality. The change was vitally connected with the transition from the performance of cult acts to the exercise of justice and mercy toward one's fellows and the manifestation of the humility becoming to man. Polytheism is not so much a form of religion as it is a manifestation of mythology. Religion in the true sense of the term was born with monotheism—it is the child of the ethical consciousness, and it is true to itself only in the form of humanitarianism.

It was by an independent line of reasoning that Paul Natorp came to the conclusion suggested by the title of his book, *Religion within the Bounds of Humanity*, obviously a paraphrase of the title of Kant's major work on the subject. As an orthodox neo-Kantian Natorp held with rigid consistency to the doctrine that reason knows nought of the transcendent and that religion must therefore renounce all attachment thereto. Religion is an expression of feeling. By feeling, however, we must understand the basis and the matrix of all mental life, whether it be that of cognition in the form of ideas, of will in the form of purposes, or of imagination in the form of aesthetic symbols. These latter, each in its own restricted and definitely limited way, are grounded in feeling; they are, moreover, accompanied by feeling, which seeks ever to incorporate them within itself and in turn to express itself through them. Thus feeling itself is boundless and infinite. Unfortunately, however, this infinite nature of feeling has often been regarded as a feeling of the infinite. When this has occurred religion has been interpreted as a relation to the transcendent. Once the fallacy has been seen, how-

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ever, it becomes clear that religion, to command intellectual respect and grip the minds of men, must restrict itself to the bounds of humanity.

While there are other versions of the bases of humanistic religion which might legitimately claim attention, we must leave them unmentioned in order now to cast a backward glance at those which we have just sketched. In the case of Natorp, it will be noticed, the transcendent is irrevocably banished; science, morality and art are given a very high degree of independence of the infinite matrix of feeling, and are allowed to move on mutually independent lines; religion, while completely detached from everything of a transcendent nature, still possesses a distinctive function, that of expressing the essential unity and harmony of the conscious life in all its typical activities, and of giving to the latter warmth even though not direction. The antithesis of the "is" and the "ought" led Kant to the postulate of a basic reality which, as the source of nature and of duty, affected their harmony; the very same antithesis led Natorp to the doctrine that the world of scientific knowledge and the system of moral imperatives are alike ultimately grounded in a unitary consciousness which has the form of feeling. The feeling itself is directly experienced in religion. Thus it is religion that establishes and reinforces the conviction that what volition develops as morally required must be possible in the world of being created by the activity of cognition. While Natorp describes his doctrine as religion within the bounds of humanity, it is clear that for him religion is not identical with social idealism or moral endeavor; rather does it testify to and reinforce the conviction of the essential unity and harmony of man's conscious life. Now Hermann Cohen, too, came with increasing clarity to differentiate religion from morality. At no time, moreover, did he

advocate the elimination of the god-idea. Though holding that it corresponds with no actual being, he urged that, as in the case of the eighth century prophets of Judaism, it sustains the thought of the unity of mankind; through it we are assisted beyond a quasi-atomistic conception of society to a vivid realization of mankind as a totality within which the life of the individual falls. Moreover, the god-idea expresses the postulate that the world presents no insuperable barriers to the development of human character but, on the contrary, offers the conditions requisite for an unending progress in morality. The individual as such, furthermore, namely in his thought of himself as an autonomous and independent being, has needs which require the god-idea. He is conscious of himself as sinful and the function of god is to assure him of forgiveness and to restore him to the tasks of ethical freedom.

III

Auguste Comte's retention of the emotional, ceremonial and ecclesiastical aspects of Roman Catholicism might perhaps be explained as a lingering survival of forms impressive even though antiquated, or as the expression of an unsound mind. Cohen's account of the necessity of the god-idea for ethical convictions, and for the concept of humanity as a reality and a supreme value, might be attributed to an excessive preoccupation with, and an entanglement in, the dualisms and the individualism of Kant; and his doctrine of its necessity for freeing the individual from the consciousness of guilt and inspiring him to the free exercise of his moral vocation might be characterized as the death gasp of a pre-modern conception of human nature. Natorp's retention of religion as testimony of the unity of man's conscious functions and as guarantee of the conviction that fact and value, actuality and moral re-

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quirement, are not permanently divorced might be charged with an arbitrary disregard of empirical observations and scientifically established facts.

Press these considerations as far as we may, however, we shall still find that the refusal to deny a distinctive rôle to religion was due, especially in the cases of Cohen and Natorp, to the seriousness with which they faced the facts of religion as they present themselves in historical phenomena and in living personal experience. That they held themselves within the limits they did might perhaps even be attributed to the restricted possibilities of the philosophies to which they were committed. Otherwise it seems not impossible that they might have been led into the paths of Schleiermacher and those who, with this great Romanticist, have found it necessary to trace religion to an independent mental factor, whether a feeling of absolute dependence, creature feeling or a sense of the numinous; or of those who have believed it necessary frankly to recognize a religious *a priori*, whether in the transcendental-critical meaning of Kant or in a psychological sense. Not merely a Schleiermacher, an Otto and a Troeltsch have thus stressed the uniqueness of religion. Even such thinkers as Windelband and the Baden school, in spite of resultant intellectual complications, have felt bound to acknowledge that religion carries us beyond the limits of theoretical, aesthetic and ethical experience as such. They have taught that it affords a mode of consciousness which forever precludes us from contentment with that which is or may be empirically actual, and that it holds before us the spiritual necessity of reverent compliance with an over-individual imperative. In the case of all of these scholars, the holy has the status of a category independent of truth, beauty and goodness, though this independence, to be sure, is far less pronounced in the case of Cohen and

Natorp than in that of the other writers whom we have subsequently mentioned. For these latter, moreover, even as for Cohen and Natorp, though to a less extent, religion is not without intimate relations to science, art, and morality, for these all are expressions of the unitary life of mind and reveal features of concrete reality.

The strength of recent humanism is in no small measure a by-product of man's amazing achievements since the rise of modern science, and of his confidence in the accelerating rapidity with which future successes are possible. Small wonder indeed that we find a widespread sense of power and of self-reliance. Nature has lost much of her stark terror; things are seen as malleable materials for the realization of human purposes. Is it not, however, sheer blindness to deny that defeat is as genuine a feature of human endeavor as is success, and that even the success that may be gained in relation to nature and life is preconditioned by an obedient regard for laws and structures that must be taken as fact? Whether we may properly speak of an instinct or innate tendency to submission is indeed disputable; what is not so, however, is the fact that nature exhibits many stubborn features, some of them precarious and others bound, so far as can be seen, to frustrate the hopes of natural man. That one is living in such a wider world, *within* which fall such successes as human wit may achieve, inasmuch as *of* it the human individual is but a constituent, is an inevitable experience at the level of self-conscious reflection. With this experience comes a realization that in the interests of his own integrity, the individual must win an adjustment of his total self to this world, along with an increasing knowledge of its nature, appreciation of its beauty, and aspiration to express and enhance its life.

The order of nature and the social realm are indeed

theatres of action, and within them man, individually and collectively, may, through the power of intelligently and imaginatively guided effort, increasingly realize his volitions. But only one such as a Fichte in his Jena years can seriously construe so much even as physical nature alone as but the sensuous material of our duty. For this the independence of our environing world is too pronounced and its claims for recognition and acknowledgement are too forceful. Let it not be said that helplessness is a state peculiarly characteristic of primitive man, as is therefore also the belief in gods; that the course of the past three centuries has given to man the right and the privilege of restricting his spiritual concerns to the discovery of fresh ends and of means for their achievement. Increased knowledge brings augmented power, but it likewise brings to the sober mind an intensified consciousness of that illimitably vast order within which human action is but an incident, and by which there is sustained and made possible such action as does occur.

What we have rapidly and roughly sought to sketch is the way in which that object emerges which carries upon it the indelible stamp of reality. And surely historical testimony and the witness of personal experience agree in the thesis that religion is a quest for the real such as the Hindu has voiced in his prayer: "Lead me from the unreal to the real; from darkness into light; from death into immortality." The concrete character of the reality which is the religious object depends in every given case upon the range and the depth of our experiencing, and upon the development of reflective knowledge. The relative strength of self-assurance may vary, as may that of other-reliance; such assurance and reliance, however, always dwell together. The call to moral effort and humanitarian devotion may be insistent and inescapable, but with it comes a

realization that final issues are outside the reach of prediction and human determination, and comes also a confidence that these issues may be acquiesced in when judged, not by present hopes and values, but by the self which, through a rationally humble attitude towards reality and the religious object, through repentant realization of his own nature, and through spiritual effort, perpetually undergoes profound reconstruction.

Religion is distinct from the reflective pursuit of truth in that it affords a sense of a concrete and ultimate totality, which is a sense of reality: with entire truth has it been said that "the category of reality belongs not to science but to religion." It is distinct from the quest of beauty in that it arouses the moral passion and the capacity for dedicated action. It is distinct from the life of humanistic devotion by the fact that it places this life within its cosmic setting and includes an adventure of faith which, however paradoxical the fact, nevertheless actually does afford a present enjoyment of the good, a prophetic realization of that which to moral aspiration is a distant goal.

Certain notions of the transcendent came in the advance of science to be thrown into the discard. As a result hereof, and of the redirection of interest to present possibilities and fruitions, the specific emotions and attitudes associated with these notions withered at their roots. There is, however, nothing in the scientific or philosophic teaching of today that forces the religious spirit to retreat from the reality that is sensed to be the most ultimate, and to protect and shelter its sensitive soul by restricting its consciousness to the compass of practical concerns for human well-being. The most comprehensive body of truth afforded by modern science is neither of such a nature nor of such solidity and security as needs to frighten any but timid souls; and philosophical criticism has reached a point

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where, though disagreeing as to precisely what science is competent to yield, we may unite in holding that this may not be regarded as either final or absolute knowledge. The limits of science by no means extend to the boundaries of the real. Scientific advances but disclose more clearly the vastnesses of the unknown that lies beyond. Scientific methods are abstract and thus afford results that are relative to the limited purposes underlying their use. Any adequate appreciation of these facts but confirms that sense of reverent wonder which at once vitalizes the spirit of religion and animates the labors of the philosopher.

To man's apprehension of reality aesthetic experience must likewise make its full contributions. Like knowledge this experience ultimately roots in that total experience resulting when self-conscious man, in the full range of his receptivity, faces and appropriates the world within which he finds himself. And the fruits of art, as those of knowledge, will be absorbed by the religious experience, and will in due course fructify life and human culture as a whole. Ethical aspiration and living, too, have their sources in that matrix of experience which represents man's total appreciative reaction toward the reality ultimate for him. Thus they acquire and retain their depth, and therefore will they issue in a comprehensiveness which in self-transcendence carries them beyond the frontiers of humanity to a reverent attitude towards the whole of life and reality, in the realization of a unity by virtue of which all are comprised within that cosmos which has come to consciousness in those bits of itself which are we. That feeling of oneness with the universe, reinforced by advancing science, experienced in the presence of beauty, and culminating the morally earnest life when this is serious and comprehensive, reconstructive of its values, and conscious of its matrix, is in one of its expressions religion itself. Re-

ligion has a cosmic reference. It reaches out beyond the world of realized knowledge and values to an encompassing whole. Science affords a large part of its creed and theology, though for religion, as for philosophy, this creed and theology are symbols and myths. Our purposes to reform our attitudes and practices, and to dedicate our powers to the specific requirements of that world which is expressed by and in ourselves, is the religious sacrifice. Our reverent wonder, our faith, and our unhesitating and unflinching submission are our worship. The call of religion, thus, is not to the confines of humanism and neo-Ptolemaism, but to the wider reaches foreshadowed by the largest universe of present knowledge and the most comprehensive aesthetic and moral values as yet within our ken.

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THE SUBJECTIVISM OF THE NEO-PRAGMATIC THEORY OF KNOWLEDGE

NEO-pragmatism, so we learn, marks the later stage and the more critical phase of pragmatism. It seems to have become necessary for two reasons: first of all, in order to "force critics to be more precise in the statement of the doctrine they are criticising," when they attack either pragmatism or at any rate what they seem to have misunderstood pragmatism to be; and, in the second place, because even the neo-pragmatist himself finds it necessary to admit that "where there is so much smoke there is undoubtedly some fire," and that "there have remained elements within the pragmatic attitude capable of giving rise to such interpretations." Thus, at any rate, we are informed by Professor Charles W. Morris, who, in a number of recent articles,¹ has not only given us the word but has expounded the neo-pragmatic theory of knowledge. It will be the purpose of the present discussion to examine this theory, especially with reference to its emphatic claim of having transcended not only the positions of the dualist and of the objectivist, but also that of the subjectivist.²

First let us briefly state this neo-pragmatic theory of knowledge as it has been *more precisely* stated by Professor Morris. To begin with "the neo-pragmatic theory of knowledge renounces completely the doctrine that experience is a revelation of and a knowledge of something independent of experience." (p. 504)³ In other words,

¹ This position is set forth in a series of articles which have appeared in *The Journal of Philosophy* and in *The Monist* during 1927 and 1928, viz. "The Concept of the Symbol," *Journal of Philosophy*, vol. XXIV (1927), pp. 253-262 and 281-291; "The Prediction Theory of Truth," *Monist*, vol. XXXVIII (1928), pp. 386-401; and "Neo-Pragmatism and the Ways of Knowing," *Monist*, vol. XXXVIII, pp. 494-510.

² Professor Morris says: "In one stroke the pragmatist has transcended the positions of the objectivist, the dualist, and the subjectivist." *Monist*, vol. XXXVIII, p. 505.

³ Pagings given hereafter directly in the text, unless indicated otherwise, refer to the second article in *The Monist*, viz. "Neo-Pragmatism and the Ways of Knowing," vol. XXXVIII.

whatever else knowledge may or may not be it is intra-experiential. And "in experience," we are told, "we are directly immersed in at least one level of reality." But "such immersion is not as such knowledge" (p. 505). What, then, is knowledge? Professor Morris answers: "An experience⁴ is revelatory of something beyond itself only at the stage of symbolic functioning, and it is only at this level that knowledge occurs. Knowledge is a function of and a product of the reflective process" (pp. 505-506). "The minded organism," he goes on to say, "is endeavoring to 'know' the stimulus⁵ by relating it to more familiar and previously known experiences, and knowledge arises when the intellectual claims or predictions as to the relations and properties of that which is being known are substantiated by occurring as predicted. An experienced item is known when by the functioning of symbols it is correctly related to other experiences, and the symbol sequence which so relates the experience in question is a case of knowledge. . . . The greater the number of verified predictions about a thing⁶ and its connections with other things,⁶ the more we know that thing.⁶ . . . Knowledge, then, is the residuum of successful judging processes, and so issues from, and only from, the symbolic functioning of events, that is, from the reflective process" (pp. 506-507). And again: "Wherever there is knowledge there is the interpretation of an ambiguous stimulus in terms of familiar associated experiences. . . Knowledge means that a problem has been solved. . ." (p. 509).⁷ And finally: "With experience conceived as a natural event, the organism is immersed in reality, but to know the world reflection made possible by symbols is necessary, and it is only when predictions made by symbols are verified by obtaining the experiences predicted that knowledge. . . . emerges" (pp. 509-510).

It will have to be admitted that all of this sounds not only very interesting but also—on the whole—fairly reasonable (though one must not let himself be deceived by the sound of it). Moreover, while definitely claiming to have "transcended the positions of the objectivist, the dualist, and the subjectivist" it still seems to account

⁴ Does an *experience* mean a particular episode, occurrence, or detail within *experience-überhaupt*?

⁵ Does Professor Morris mean the *stimulus* or the *stimulating object*?

⁶ Is it the *thing* or the *stimulus* caused by the thing which is meant here?

⁷ Yes, but before the problem has been solved, that is to say in the *getting* of knowledge, is it not necessary to acknowledge a non-experiential substance or object which is involved in the *getting*?

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for the element of transcendency in the knowing process and at the same time assures us to have real contact with reality. It further insists upon placing the entire knowledge situation squarely *within* the realm of actual human experience. Whether neo-pragmatism can really do all of these things and still remain consistent with itself—this is another question.

Supposing one were to admit that "experience is not a revelation or appearance of some metaphysically distinct or different reality" (p. 496), that would hardly be identical with saying, or even justify the conclusion, that therefore the metaphysical reality is itself the experience. The fact is, Professor Morris admits this later on, when (on page 509) he states that "the difficult problem of the relation of experience to reality remains," a statement which he seems to forget in most of his argument. But, even aside from this, the above supposed admission can hardly be made. For everything that is revealed in experience is tinged with the fact that it *is experienced*. Nothing given in experience is independent of the experience in which it is given. There is no such thing as direct grasp of any external real as it is without reference to the experiencer. Nor is it true that "to have an experience is just to have it, and not to know anything about it" (p. 505). For, as Professor George P. Adams has clearly shown in his presidential address of 1927 on "Immediacy and Meaning,"⁸ every experience which is even enough of an experience to be apprehended as having been 'had' is, after all, by virtue of that apprehension already something more than the merely 'had experience.' It has a meaningful content and that—so far forth—is a type of knowledge. A merely 'had experience' without such meaning or without being apprehended would not even be recognized as having been had, *i.e.* it would be an unconscious experience and consequently would not be 'experienced' in any *meaningful* sense of this term at all. To be empty of meaning certainly equals meaningless.

Besides, Professor Morris grants that in the knowledge situation at least "an experience *is* revelatory of something beyond itself." For, while he insists that "in experience we are directly immersed in at last one level of reality" (which, however, is by no means equivalent to saying that experience is immersed in reality-as-such, and much less that experience and reality are identical, an argument

⁸ Cf. this paper in *The Philosophical Review*, vol. XXXVII, No. 2 (March, 1928), pp. 109-132.

which I have already brought out, but which can stand repeated emphasis), he is equally emphatic in saying that "such immersion is not as such knowledge." Knowledge, we are told, occurs only at the level of symbolic functioning; in other words, it is said to consist of "the relation of symbolic to non-symbolic events." Thus, while refusing to admit the transcendental character of all human experience, Professor Morris seems to be perfectly clear in granting the transcendental character of *knowledge*.

On the other hand it is next to impossible to see anything but subjectivism pure and simple in such statements as the following: "The minded organism is endeavoring to 'know' the stimulus by relating it to more familiar and previously known experiences, and knowledge arises when the *intellectual*⁹ claims or predictions as to the relations and properties of that which is being known are substantiated by occurring as predicted. An experienced item is known when by the functioning of symbols it is correctly related to other experiences, and the symbol sequence which so relates the experience in question is a case of knowledge." Just how subjective the first of these two sentences is may be seen even more clearly by adding a few words (in italics) which—to the present writer at least—would not only seem to be quite in harmony with Professor Morris' position and argument, but which would even seem to state that position in this connection more precisely. Viz. "The minded organism is endeavoring to 'know' the stimulus by relating it to more familiar and previously known experiences, and knowledge arises when the intellectual claims or predictions as to the relations and properties of that which is being known *in experience without reference to anything which might be transcendental to experience* are substantiated by occurring *in experience again* as predicted."¹⁰ It is true, one of the sentences which follows very close upon the heels of the one just quoted in Professor Morris' paper contends that "the greater the number of verified predictions about a *thing* and its connections with other *things*, the more we know that *thing*" (p. 507).¹¹ This reference to '*things*' seems again to be a fairly clear case of going beyond predictions, intellectual claims, and even beyond

⁹ Italics not used in the original.

¹⁰ All italicized words in this sentence are added by the present writer, though the sentence otherwise is a quotation from Prof. Morris' article in *The Monist* (1928), p. 506.

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stimuli to the things themselves, transcendental to all these claims and predictions. But even here it must not be forgotten that, according to the argument of the paper (at least if the present writer understands the main purport of it at all correctly), these 'things' are just as much *within* the realm of experience as are predictions, symbols, the reflective process, and stimuli. And this in spite of the fact that to the knowledge-experience at least Professor Morris had previously granted a transcendent character (as we have already pointed out above). In other words, despite guarding himself at one or two points against a subjectivistic explanation of knowledge, Professor Morris nevertheless finally falls headlong into this very position. This fact becomes even more apparent in the sentence with which he closes this particular section of his argument and which follows directly upon the heels of the one quoted last, viz. "Knowledge, then, is the residuum of successful judging processes, and so issues from, and only from, the symbolic functioning of events, that is, from the reflective process" (p. 507). A more complete surrender to subjectivism in the theory of knowledge can hardly be expected than this statement offers.

On page 509 Professor Morris goes on to say that "wherever there is knowledge there is the interpretation of an ambiguous stimulus in terms of familiar associated experiences." Now it is obvious that when a "stimulus" is "ambiguous" it needs to be made unambiguous. And this involves some sort of procedures. Now the question is: upon what are these procedures directed? Are they directed upon the "stimulus," or upon the "experience," or upon the thing *arousing* the stimulus? In other words, when procedures are adopted, looking toward the clarification of the meaning of the stimulus, what is the *intentional* character of the procedure? Does it intend *thing*, or does it intend *stimulus*? Furthermore, "interpretation of an ambiguous stimulus" is a reflective (and therefore quite subjective) process and is not identical with successful apprehension of the external thing itself. The external thing itself is *one* of the causes of the "ambiguous stimulus" (the receptive sensory apparatus of man being the other), but 'thing' and the 'stimuli' are *not identical*. And even if they were, the "interpretation" of it "in terms of familiar associated experiences" already vitiates the possibility of knowing that thing as it is in itself, by having its knowledge determined not purely by the nature of the thing itself, but by the

stimulus-as-interpreted-in-terms-of-familiar-associated-experiences. Thus knowledge is relative to the observer (as indeed Morris himself admits on page 505). We may go on with Morris and admit this knowledge as *certain*, but it is certain *only* because its certainty depends on the coherence of the system of the observer's experiences (for even the elements of successful or verified prediction are in this realm). In other words, the certainty is after all *subjective* certainty and not the certainty of objective comprehension or grasp.

One further difficulty in Morris' attempt to get out of his subjectivism needs to be pointed out. If, in his statement that on the level of symbolic functioning, which is the only level on which knowledge is said to occur, "experience is revelatory of something beyond itself," Professor Morris admits the transcendent character of knowledge, it is only fair to ask: what is that 'something beyond'? There does not seem to be any way of answering this question, especially not since the general argument seems to contend for the all-inclusive character of experience and for the impossibility of telling what anything beyond experience might be—if there were any such thing, since obviously we can know only what in some form or other comes within the realm of our experience.

Nor is it clear—on the basis of the general argument of the article—how knowledge (and truth, for the two are said to have identical logical status) could be said to be found "in the relation of symbolic to non-symbolic events" (p. 506). For knowledge, it has been asserted most emphatically, "occurs only at the stage of symbolic functioning." And the problem is *precisely how* to relate non-symbolic events to symbolic ones; or, how symbols can adequately represent facts and things which are themselves *not symbolic*. Nor is this problem solved by saying that, after all, both symbols and things are experiential (events within experience), for it is not experience which is to be related but symbols and things, and, unless either symbols *are* things or things *are* symbols, to say that both are aspects or events of and within experience does not yet explain or even describe the relation of these two experimental events to each other.

Another difficulty is found in Professor Morris' attempt to identify knowledge and truth. "Knowledge," he says, "is the residuum of successful judging processes" (p. 507).¹² "Since every truth is

¹² Italics not used in the original.

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a case of knowledge, the logical status of the two is identical" (pp. 507-508). To 'know,' for Morris, is therefore identical with knowing correctly. False interpretation he does not seem to admit as 'knowledge.' What, then, is it? What is error, if not a case of knowledge, even though of incorrect knowledge? Certainly a theory of knowledge must be able to account for error in some fashion or other.

If, on the basis of the general argument of the articles, one ask again, what, precisely, does Professor Morris mean by knowledge, the best one would seem to be able to get as an answer would be somewhat as follows: *knowledge is the assimilation in experience of non-symbolic (transcendent?) events through the reflective processes of symbolic functioning.*

But such a statement contains at least two outstanding difficulties. First of all, where, since it has previously been asserted that *only* at the stage of symbolic functioning does experience reveal any transcendent factors or events, do the non-symbolic (transcendent) events come from, which are to be assimilated? Is there any answer to this question? Or, rather, *can* there be any answer to it in the light of the argument of Professor Morris' articles?

And, in the *second* place, there seems to be no way whatever of telling what that "something beyond" (i.e. the transcendent factor or event) is, except that—although in itself "*non-symbolic*"—it is assimilated through the reflective processes of *symbolic* functioning to the total experience of the knower. And this, so far from being an answer to the second question, only seems to increase the difficulties of the problem.

Moreover, if "it is only when predictions made by symbols are verified by obtaining the experiences predicted that knowledge occurs" (p. 510), then the whole knowledge situation shows itself again as purely *subjective*. For predictions are made by the subject; symbols are substitutes used by and having meaning for the subject; and the "predicted experiences obtained" as experiences are again the experiences of the subject—despite the attempt to take 'experience' as an all-inclusive whole. Consequently, despite Morris' assertions to the contrary, there does not seem to be any *really* transcendent element in the knowledge as described and defined by him. No wonder that he thinks he has solved the knowledge-problem: for it is easy to do so when one just quietly brushes

aside the one aspect of this problem which has always been the most difficult, namely that of the question of transcendence. But above all it is certainly not quite fair, after having simply brushed the difficulty aside without even having recognized it much less tried to solve it, to claim to have reached a non-subjective solution of this problem.

It will have to be admitted that there seem to be evidences in Professor Morris' articles which would indicate that he tried to get out of these various difficulties by the widening of the concept of 'experience' so as to make this concept all-inclusive.¹³ At any rate 'experience' used in this broad connotation plays a commanding rôle in the development of his theory. Professor Morris seems to feel that, having taken experience as a natural event occurring in the natural life of an organism immersed in reality, the question of the poles of subject and object—the problem which has been the bugbear of epistemology through the centuries—has just naturally been resolved in this medium of 'experience.' Knowledge occurs, then, whenever it is possible to obtain within experience the results which had been predicted (through the reflective process of symbolic functioning) in experience. All of this may sound quite simple. But is it really so simple? If 'experience' has become so enlarged as to be inclusive not only of the subject and the action, behavior, and thought of the subject, but also of the external stimuli which arouse the subject, and even of the objects in the external world which are the real basis for these external stimuli—then, I fear, 'experience' has become so broad in its signification as to be practically meaningless; it might then be simply set to equal the universe,¹⁴ at least to equal the universe-as-capable-of-being-known. But to do so gives us only a sham-solution of the epistemological problem. That is to say, such a position would seem to solve the knowledge-problem *theoretically* by bringing subject, object, and stimulus all within the one realm and medium of experience, within which single realm knowledge is simply one way of behavior, namely that of the symbolic functioning of the processes of reflection. But in the *actual* experience of man the duality (or, perhaps, better, the trinity) of the knowledge relation still exists; for here the knowing person still

¹³ A use of the term which, of course, is quite familiar in philosophical circles since Dewey's *Experience and Nature*.

¹⁴ The whole concept is, in fact, strangely reminiscent of the somewhat out-of-date and discredited Absolute of objective idealism.

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However, it is not even quite evident from Professor Morris' arguments that he means by 'experience' the just described all-inclusive medium. There seem to be at least some evidences in his argument that in the *particular experience* of 'knowing' at any rate there is a transcendent element: man's reflective process by the use of symbolic functioning reaching out beyond the actual experience to something which is *not* the symbol (but for which the symbol is a substitute) nor the experiencing and reflecting subject but transcendent to both: i.e. facts or things in the real world outside of the subject—but for that reason by no means beyond the possibility of coming within the realm of my experience through my capacity to experience the real world in the reflective process of symbolic functioning.

If this comes closer to Professor Morris' actual meaning, then the problem remains: How can we say that in experiencing the real (subject-transcending though *not* experience-transcending) world by the reflective process of symbolic functioning we are actually experiencing the *real world*? Does this not simply amount to the dogmatic assertion that, since this reflective process of symbolic functioning seems to be the only way in which the human mind can apprehend the real world, such apprehension is not only direct but *knowing* (that is to say, *successful* knowing) contact with reality as it really is? Nor is this difficulty overcome by saying that in so far as such apprehension is valid knowledge it is that by virtue of the fact that results have been obtained as predicted by the reflective process of symbolic functioning. For these results are either again in the form of symbols—in which case there would seem to be no way of comparing either the symbolic prediction or the symbolic results with the actual facts in the world which transcends these symbols; in other words, we would be fairly shut up within our own mental (reflective) processes of symbolic functioning. Or else the results *are* in the external world and in that case—on the basis of the whole previous argument of Professor Morris—we can only have *knowledge* of them through the reflective process of symbolic functioning; in which case we are precisely again where we were before: namely we have no way of comparing the actual results in

the external world with the results within our reflective processes of symbolic functioning.

So we are finally forced to say that Professor Morris in his neo-pragmatic theory of knowledge, so far from having provided a solution of the epistemological problem which "transcends the positions of the objectivist, the dualist, and the subjectivist," has precisely fallen into the trap of a thorough-going subjectivism, in which his prediction and result-obtained theory is not much more or less than the old coherence theory of truth of the idealists.¹⁵ Such, at any rate, seems to be the import of such a statement as "Wherever there is knowledge there is the interpretation of an ambiguous stimulus *in terms of familiar associated experiences*" (p. 509).¹⁶

It is, of course, possible, that I did not quite comprehend the position of Professor Morris. But if this should be the case, I think that, in all fairness to the rest of the philosophical world, he owes a statement of his position which shall be sufficiently clear, precise, and unambiguous so that it will enable the reader to know just exactly what he does mean. In the meantime we would seem to be obliged, by the force of his own argument, to classify his theory of knowledge as unequivocally subjective.

If, in this discussion, I have concerned myself more particularly with Professor Morris' position than with neo-pragmatism as a general movement this was done because, in the first place, it seemed best to point out the weaknesses of the position by actual and fairly recent quotations from one of the leading exponents of the theory, lest the critic be accused again that he is not "precise in the statement of the doctrine" which he is criticising; and, secondly, because Professor Morris himself avers that he wrote his articles in order to provide us with a "precise formulation of the pragmatic account of knowledge,"¹⁷ and one ought to criticize the precise formulations rather than those which may be more vague or tentative.

¹⁵ Cf. on this point the present writer's paper on "Aspects of Permanent Value in the Coherence View of Truth," *The Personalist*, vol. X, No. 3 (July, 1929), pp. 168-177, especially pp. 169-172.

¹⁶ Italics not used in the original.

¹⁷ Cf. page 495 of the second *Monist* article.

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A REPLY TO PROFESSOR SCHILPP

I AM grateful to Professor Schilpp for the time he has taken with my articles, even though he has concentrated his attention upon such a small part of them. Nevertheless, to be brutally frank, his own article carries no conviction with me whatever, and has called out no change of heart. The article on knowledge (*The Monist*, vol. XXXVIII, pp. 494-510), which furnishes his main basis of argument, was aimed at showing the inadequacy of Professor Montague's book, which neglected to give serious attention to the critical aspects of the instrumentalist position, rather than at giving a detailed presentation of the instrumentalist view. Indeed, I spent barely three pages on this presentation, assuming that Dewey, rather than myself, had made a real contribution here. If Professor Schilpp wants to cross swords with a really "leading exponent" of such a view, let him deal with Dewey's *The Quest for Certainty*, or with Lewis' recent *Mind and the World-Order*, in which Lewis calls his view "conceptualistic pragmatism," a title which connotes very much what I intended by the term "neo-pragmatism." By such references I do not, of course, wish to apologize for my own words, or to transfer to any one else the responsibility for them.

Leaving aside the numerous minor points which might call for discussion, the main intention of Professor Schilpp's article is to damn me with the epithet "subjectivism." His argument seems to be somewhat as follows: since the symbols and predictions are those of a subject, and since the experiences completing the prediction are those "of the subject," knowledge does not transcend the subjective experiences of a subject. I take it that the criticism is not merely that on the symbolic view knowledge is relative to a subject, but that it does not get beyond the subject. The "weaker" claim seems to me to be true, and the "stronger" claim to be false and not an

implication of the theory in question. It may be noted that Professor Schilpp would seem to deny both claims, because in spite of certain confusing statements, he is obviously anxious for knowledge to grasp the "real-as-such," which for him transcends experience, and to be determined "purely by the nature of the thing itself," and not at all by the subject. Does he mean that knowledge is not relative to a subject or that what is known is not so relative?

If Professor Schilpp were to claim that the view I have given is an experimental account of knowledge, and that on this view there would be no knowledge without reflective processes, this would be merely reporting what I said. But he intends "subjectivism" to have other connotations, such as the suggestion that knowledge is somehow only an affair of the subject and not a transaction with anything beyond the states of the subject.

The decisive question becomes the conception of the relation of experience to "reality." Professor Schilpp apparently regards experience as intrinsically mental and as a state of a subject. I do not. He seems to have forgotten my claim (*op. cit.*, p. 504) that the symbolic approach to knowledge was untouched by the question as to whether experience is selected or generated by the presence of the organism, or as I may now say, by the presence of a subject. Merely to say that knowing involves reflection, and that the thing known is some factor of experience, does not involve the denial of the view that the thing known is some aspect of "reality" which has entered into experience and which may suffer no change by this new relation. Indeed, if the subject is itself stated in terms of experience, and such a statement is an ideal of a radical empiricism, it is difficult to see what could be meant by calling experience in general "subjective." In other words, nothing that I have said in any article is incompatible with a neo-realistic metaphysics, while the addition of the symbolic theory of knowledge would free neo-realism from its embarrassment with the problem of error.

However, even if experience is dependent upon a subject, Professor Schilpp's argument is still inadequate. He has forgotten another statement in the article he has so freely quoted: "It would seem that merely recognizing the relation of content to a subject does not make such content subjective, in the sense of making it a mental state of a subject-mind." (*op. cit.*, p. 499). Experience may quite well be relative to other factors, even while it is relative to a

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subject, or to a subject-mind. If fact, if experience be taken as a natural event, the subject may at best be only one of the conditions under which the event takes place, and such a view hardly implies the "all-inclusive experience" with which Professor Schilpp attempts to frighten me.

My conclusion is that while knowledge is an occurrence in the biography of a subject (however the subject be interpreted), what is known need not be mental, or be constituted by the subject, though such occurrences can also be known. Even in those cases where the subject is *one* of the conditions under which the object that is known takes place, this object is as "objective" as "subjective," and knowledge is still not properly classed, without qualification, as "subjective."

While metaphysics is not knowledge, but opinion, the view of knowledge which I have stated is compatible with any metaphysics, and is certainly not tied down to subjectivism. Indeed, for my part, its affiliations are with a modified form of neo-realism and objective relativism. In pointing out that the subject is one variable in the knowledge relation, a theory is certainly not committed to subjectivism in the case of the object known.

As James would say, as far as I can see, Professor Schilpp's article leaves my "withers unwrung." Perhaps his difficulties will lead him to develop some view of the nature of the subject and the meaning of the term subjectivism, and this would be all to the good. In social theory we are learning not to condemn an advocated change by the application of the emotive epithet "socialism," and it is high time that philosophers should not pretend to still an argument by fastening on it the emotive and highly ambiguous appellation of "subjectivism."

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SOME RECENT BOOKS

Marx and Lenin: The Science of Revolution. By Max Eastman. New York, Albert and Charles Boni, 1927. Pp. 263. \$2.00.

The gist of this book seems accurately put in the following summary carried on its jacket: "Part I. Orthodox Marxism asserts that the material world is inevitably evolving, through class struggle, to a dictatorship of the proletariat which will usher in the communist society. Ideas in the minds of socialists and communists are a "reflection" of this inevitable process. In other words, Marxists attribute their own purpose to an external Reality, and conceive themselves as co-operating with that Reality. This is a religious, or animistic way of thinking—no matter whether you call that Reality matter or spirit. Part II. Marxism must be restated in the form of a scientific hypothesis, as follows: By organizing the class struggle and carrying it forward to a dictatorship of the proletariat, it will be possible to usher in a communist society."

Simple as is the change demanded by Eastman, he regards it as most far-reaching in its consequences in that it alone removes the last vestiges of an illusionary Utopianism and puts the Marxist in proper relations with modern science, creative art and moral education. To quote the closing words of his book: "It presents the revolution as a purpose rather than a belief, and the Marxist as a scientific engineer of revolution."

Numerous notes and bibliographical references enrich an essay characterized by a simple yet important thesis and by a lucid and earnest style.

Possibility. By SCOTT BUCHANAN. New York, Harcourt Brace & Co., 1927. Pp. 198. \$3.50.

This essay represents the search for "a general methodology, not merely for this or that discipline, but rather an organon of intellectual imagination." It seeks an intellectual way of life, which, while perhaps not leading to future discovery or invention, may bring peace of mind in the midst of the present confusion of doctrines. Absolute possibility, the sort written about by philosophers and theologians, is distinguished from imaginative possibility, as exhibited in the fine arts and literature, and from scientific possibility. The first of these is discussed in reference to the philosophies of Kant and of Aristotle, "where possibility has played a deciding rôle;" its use is staunchly defended against the charge of vicious teleology. The metaphysical outlook of the book regards experience as "like visible light. As a whole it is the source of light; its parts are visible objects in all their concrete richness; ideas are reflecting mirrors and refracting prisms affording antiphonal understandings which are focused in immediate intuitions."

The Philosophy of John Dewey. By Joseph Ratner. New York, Henry Holt and Company, 1928. Pp. XII + 560.

The purpose of this volume "is to help make Mr. John Dewey's philosophy accessible to the lay reader," in particular, "to assist him to understand Mr. Dewey's basic philosophical principles, not only in themselves, but in their manifold relations to the rest of his work." To this end, "it was necessary to arrange the selections in the order demanded by the logical development of ideas and in the natural relationships of the various branches of philosophy to one another." Accordingly, Mr. Dewey's philosophic method, metaphysics and logic come first, and only afterwards are presented his doctrines on psychology and ethics, education and politics, art and religion.

Mr. Ratner has neither supplied annotations nor attempted interpretation; he has limited himself strictly to the task of selection and arrangement, with only "slight verbal changes in the original text so that the transmission from one selection to another may be natural and smooth." The selections seem to be wisely made and the book, besides fulfilling its main purpose, should be valuable as a text in courses on the philosophy of Dewey or of contemporary life.

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